

# AUSTRALIAN Electronics ENGINEERING

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# How important is R&D?

**A**lmost everyone recognises the importance of research and development. If companies are not prepared to invest in R&D then, effectively, we will have no industry except that which can be culled from the big multinationals that do business here. They can be forced to manufacture their products locally in return for government contracts. However, if that were the only industry we had, the industry would be very much smaller, less competent, and we would all be incomparably poorer.

In fact, a key feature of the growth parts of the industry is their international competitiveness. The article on Protel in this issue illustrates the point. This is a company that makes 90% of its turnover overseas. While this state of affairs doubtless depends on considerable business acumen and marketing flair, the basis of Protel's success is that its management is prepared to plough a considerable part of its profit into R&D. For such companies, R&D is not a luxury, in fact, but an inevitable cost of doing business.

Protel, and companies like it, remind us that our willingness to undertake R&D is a direct measure of our willingness to play in global markets. Globalisation is only a threat to us if we are not prepared to invest in it; if we are, then globalisation is an opportunity.

Mr Barry Jones, the Last Great Science Minister, used to say that there are two possible models of industrial stimulation — technology push or market pull. Either you pay for R&D directly, and hope that ameliorating the cost of R&D will cause companies to do more of it; or you create markets for companies, say through government purchasing, and hope that if the rewards are great enough, companies will be prepared to risk R&D funds.

Since Jones' day, in the early 1980s, Australia has followed a path of technology push — stimulating R&D expenditure through direct grants to CSIRO and tax concessions to companies. The Labor party's R&D support schemes, supported and continued by the current government, have had some success. Companies like Protel do exist, and they probably would not if the government had not created a suitable climate. But is the industry as big as it could be? Almost certainly not.

We need clear, consistent, government policy. Successful industries around the world always work hand-in-glove with government. That's true of weapons and cinema in the US, electronics in Japan, car makers in Korea, and gold miners in South Africa. The position in Australia is very different. Here the electronics industry is just another special interest groups. The tone of different political administrations is set, not by any moral or philosophical differentiation, but merely by which of these groups has managed to establish good connections with the people in power.

The consequence is that it is almost impossible to evolve a coherent policy. If one is a politician, one supports the person with the loudest voice — the group that has the best access to the media.

Seen in this light, the beauty of current R&D arrangements is that they are underwritten by a small piece of philosophy we can all share. Almost everybody in government thinks we should do some, and foregoing a bit of tax revenue seems a small price to pay to keep the scientists happy.

But it only goes so far. If we want more, the industry will have to increase its access to government, and ensure its voice is at least as loud as those of other pressure groups. It also needs to create a consistent message on government support for the industry, so that it can take advantage of events as they happen. □



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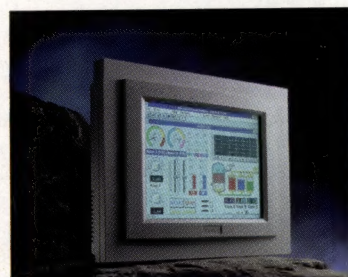
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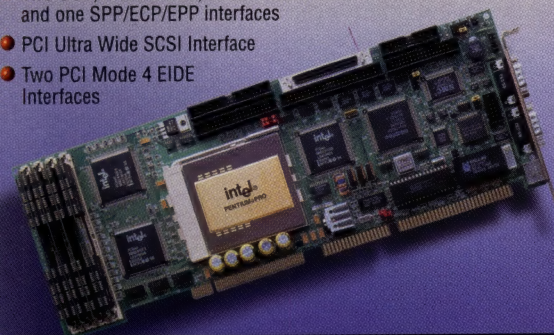
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# Asian slide hits home

**T**he currency crisis in South East Asia is causing some nervousness in the Australian electronics industry. "It is beginning to have a significant impact on export prospects of the electrical and electronic industries, with members already reporting lost orders," said Alex Gosman, executive director of AEEMA (the Australian Electrical and Electronic Manufacturers' Association).

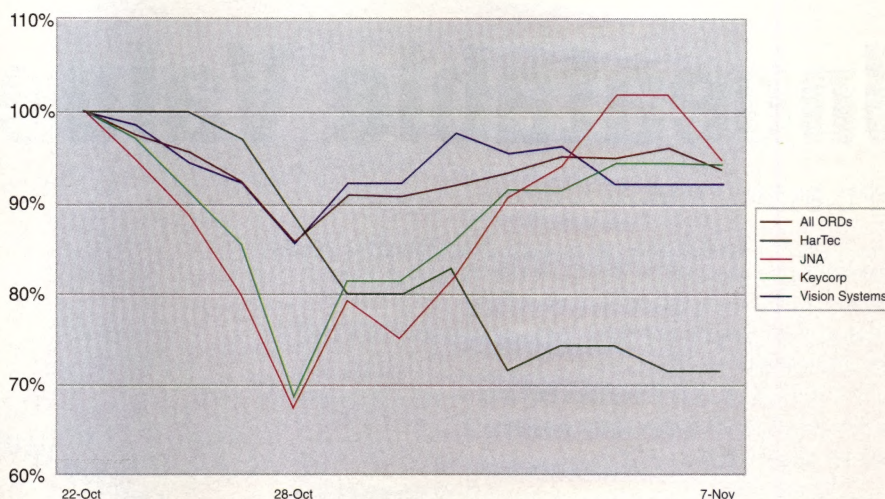
The cause of this crisis is similar to that which precipitated the 1987 stock market crash. The "tiger" economies of the region grew rapidly, largely funded by speculation in property and shares. Economics analyst Robert Gottliebson said that in Hong Kong and the ASEAN countries "the combination of unlimited credit and apparently unstoppable growth encouraged great risk-taking, much of it based on property as occurred in Australia in the 1980s."

The trigger for all the trouble came in July when the Thai government floated the baht, breaking a link with the US dollar. It lost almost a quarter of its value very quickly. Before too long, the currencies of the Philippines, Malaysia and Indonesia were also struggling. This started causing jitters in Japan, which provides a lot of the investment in South East Asia. Uncertainty grew in Hong Kong, partly because of the handover to China but mainly because it has a number of stock market cowboys, just like the ASEAN countries.

The Hong Kong stock market began to slide, losing 40% of its value over a couple of months, including more than 10% on October 23. This triggered slides on all the world's major markets, not least the Australian, which lost nearly 15% of its value between October 22 and 28. By the time things settled down in early November, it was still around 5% below its previous mark.

Electronics companies listed on the Australian stock exchange don't seem to have fared significantly better or worse than average. Some dipped very sharply on October 28 but in most cases those falls were recovered the following day. Other companies weren't so lucky. Hartec shareholders will be disturbed to see their share price down by nearly 30% after the dust cleared.

However, the sharemarket isn't most people's biggest concern. The South East Asian currencies still haven't recovered



Stock market variations around the time of the crash. Figures are relative to prices on October 22.

and companies exporting to the region aren't entirely sure whether all their current and future contracts will be honoured.

Jim Segredos, from South Australian communications manufacturer Codan, said the company hadn't lost any sales yet but was experiencing delays with a number of projects being put on hold. "It will affect anyone selling into Asia, particularly industrial products," he said. "These contracts are primarily tender-based and mostly in US dollars so the customers are going to be under a lot of pressure to meet them. We're expecting a mixture of delaying of orders at best to outright cancellation."

He also predicted a slowdown in the number of smaller contracts being offered over the next year. Although Codan earns 85% of its income from exports, Segredos said sales are spread across the globe and typically involved around 80 countries each year. "We're fortunate to have a very wide exposure. Asia is only a part of our export mix."

Perth-based ERG said it hadn't lost any contracts either but it was playing a waiting game, looking at all the scenarios, looking at margins, and basically making sure it has a long term strategy to cover them in the event of any cancellations.

AEEMA telecommunications project

manager Catherine Higgins said the situation was causing medium-term uncertainty within the industry. She said the Association had received reports from Indonesia that a number of energy projects in the country had been cancelled but most telecommunications projects seemed to be going ahead.

The federal government is still talking the region up. Foreign minister Alexander Downer said the government's confidence in the fundamentals of the region and its future prospects were unchanged by recent events. "The World Bank's principal regional economist only recently pointed out that the countries of South East Asia are all maintaining sound fiscal positions with Malaysia, the Philippines, Singapore and Thailand all running budget surpluses last year," he said.

"Moreover, regional economies continue to maintain high rates of domestic savings — Malaysia, Indonesia, Singapore and Thailand all save more than a third of annual national income. Underlying inflation is relatively low in Malaysia, Singapore and Thailand. And the nations of South East Asia remain competitive producers of various goods and services that have strong international growth prospects. Indeed they are all more competitive now that local currencies have dropped, particularly against the yen." □



# Malaysia positive about Proton

Putting aside concerns about the country's currency, the Central Bank of Malaysia and the Payment Consortium of Malaysian Banks have selected the Banksys Proton E-cash technology for their multipurpose smart card system.

The successful contractor, Triumphant Launch, is owned jointly by West Australian company ERG and the Belgian company Banksys. ERG will provide the resources and support to Triumphant Launch to enable the system to be introduced in Malaysia during 1998.

Malaysia is the fifteenth country to implement the Proton system and the first to implement a national strategy on smart cards. The disposable E-cash card is the first of three cards to be introduced in the strategy. The government also has plans to launch a government multipurpose card, combining national ID, driving licence, medical, immigration application and optional E-cash; and the payment multipurpose card, incorporating international credit, debit, ATM and E-cash.

Two pilot programmes will be conducted to test functional performance and consumer acceptance. The technical test will be conducted in a closed environment, such as a university, and will involve less than 2500 cards and 300 devices. The commercial test will be conducted in a restricted geographical area with around 100,000 cards and 5000 devices. ERG company secretary Ian Allen said, "Success in Malaysia will be a significant endorsement for Triumphant Launch throughout Asia and clearly supports the carrying value of Triumphant Launch in ERG's accounts." □

**ANU physicists have made a prototype device that may in the future increase the capacity of the Internet,** according to the ANU Reporter. Led by Professor Hans Bachor, the team has found a way to selectively reamplify tiny light signals, without increasing background noise, theoretically making it possible to put more information down optical fibres. Prof. Bachor said markets for the device won't exist, however, until information loads on the Internet rise significantly from current levels. □

**Motorola Semiconductor Products Sector is selling its MOS 10 manufacturing facility in Irvine, California.** The company said it is restructuring to focus on its core competencies. □

**Gerard Industries is currently criss-crossing the country with its Clipsal Industrial Truck,** a showcase of the company's industrial electrical accessories. The truck carries all of Clipsal's latest industrial releases including the 8 series moulded case circuit breakers. The truck began its tour in WA, visiting Albany, Kalgoorlie, Bunbury, Geraldton and Esperance. It is now heading for Victoria and will continue to NSW, QLD and NT until February 1998. □

**AusIndustry is calling for applications for R&D grants for projects over \$2 million.** The project must involve research and development and have clearly identifiable commercial potential. Companies with an annual turnover of less than \$50 million can apply. Applications close 28 January, 1998. Call AusIndustry on 13 28 46 for more information. □

**Daewoo Electronics and SGS-Thomson Microelectronics have announced an agreement to establish a joint design centre company in Seoul, Korea.** The centre will be used to develop ICs for existing consumer electronics applications and future products for digital and high definition TV, digital VCR and DVD, and telecommunications. □

**Optus Communications has launched its EFR (enhanced full rate) technology.** Designed to improve voice quality over mobile networks, the technology represents a new algorithm for converting analogue speech signals into a digital format. □

**The Federal Government's plan to outsource its information technology requirements have met with a mixed response.** The Australian Telecommunications Industry Association (ATIA) has welcomed it for its potential to drive investment in the IT&T sector. However, the Community and Public Sector Union (CPSU) is opposing for fears of job losses and damage to the local industry. The CPSU welcomed a Senate report recommending that Government agencies be given the option of not outsourcing. □

**Early next year, AEE will be moving offices.** Even though we'll just be over the road and round the corner, we'll have new phone and fax numbers as well as a new address. Our details (as of 19 January 1998) will be:

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## Telecomms training centre opens

The first dedicated telecommunications training centre was opened last month at the Lidcombe College of TAFE in Sydney. The \$20 million centre was built with funds from Optus and both federal and state governments, and will be managed by Optus Communications.

Optus CEO Chris Anderson said, "Telecommunications is Australia's fastest growing industry, creating jobs and opportunities for many Australians. The Technology Education Centre will provide future telecommunications professionals with the skills and knowledge essential for this rapidly advancing industry."

After completing a three year cadet-

ship at the centre, encompassing theory as well as on-the-job training, Optus cadets will graduate with an Advanced Diploma of Telecommunications Engineering from TAFE, the first qualification of its kind in Australia.

The centre is mainly used by Optus staff. However a certain number of hours a week are allocated for non-Optus students to use the facilities towards their TAFE qualifications. From 1998 TAFE will offer the same course to the public.

The Centre has nine classrooms and two laboratory areas, and houses \$14 million worth of advanced telecommunications equipment. It can cater for up to 150 students at a time. □



Marconi Instruments recently fulfilled a major instrumentation contract with the RAAF by supplying 50 Marconi 2945A communication service monitors, and running staff familiarisation courses. Pictured are Sgt. Brian Harris (left) of the RAAF's Ground Support Equipment and Logistics Management unit, with Marconi's Cliff Lever and one of the monitors. □

## Much farther, the Sun and the holy grail

Pacific Solar is going for broke in its bid to accelerate the production of solar modules that can compete cost-wise with other forms of electricity. The company expects to begin construction of its first factory in mid 1999, six months ahead of schedule, with initial production of solar modules in late 2000.

A solar module which is cost-competitive with other forms of electricity has long been the "holy grail" of solar designers, as the cost of solar power has always been much greater than other more environmentally harmful forms of electricity generation. Pacific Solar has seen its goals come closer due to excellent progress made this year. Successes include the fabrication of an operating version of its new technology, the 150 x 150mm photovoltaic mini-module; the investment by Pacific Power in the company this year of \$10.4m, and engagement of an industrial design company to help Pacific Solar's engineers design and develop the first complete "plug and play" rooftop photovoltaic system.

The company also raised \$5.9m to develop a low-cost inverter, a module that will enable electricity generated by a rooftop solar panel to be fed straight into the household wiring and the electricity grid. □

## Datacraft acquired

Datacraft Ltd has been acquired by Dimension Data Australia, a joint venture between Australian company Com Tech Communications and its South African partner Dimension Data Holdings. Datacraft will merge with Com Tech Communications to form Com Tech Integration, which is a part of the Com Tech Communications Group.

The A\$320 million deal also bought Dimension Data a 55% interest in Datacraft Asia. Commenting on the merger of the two companies, David Shein, Com Tech Communications' managing director, said, "For the first time in Australia

our complementary skills provide our customers with a genuine end-to-end networking solutions partner."

Dimension Data's international director Pat Quarmby commented further that "the combination of the two forces results in what we will believe will be the premier network integration group in Asia Pacific."

While Phil Belcher, managing director of Datacraft Australia has been retained as the general manager of Com Tech Integration, the Australian Financial Review reported that 50 staff had been dismissed from Datacraft. □

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**Mobiles 98, March 31 - April 2**, Forum The Grace Hotel, Sydney NSW. Contact: IIR, tel (02) 9954 5844, fax (02) 9959 4684, email: [info@iir.com.au](mailto:info@iir.com.au) □

**NEPCON 98, May 26-28, 1998**, Sydney Convention & Exhibition Centre, Darling Harbour. Contact: Debbie Cadet, Reed Exhibitions, tel (02) 9318 4742, fax (02) 9310 5592. □

**48th Electronics Components & Technology Conference, May 25-28, 1998**, Seattle, USA. Contact: Jim Bruerton tel 0011 1 864 963 6621. □

**21st International PCIM/Power Quality Conference 1998, May 26-28, 1998**, Nurnberg, Germany. Contact: ZM Communications, email: [conference@zm-com.com](mailto:conference@zm-com.com) □

**15th International Electronics, Testing Equipment & Instrument Exhibition for Asia, July 23-26, 1998**, Hong Kong. Contact: Business & International Trade Fairs, tel 0011 852 2865 2633. □

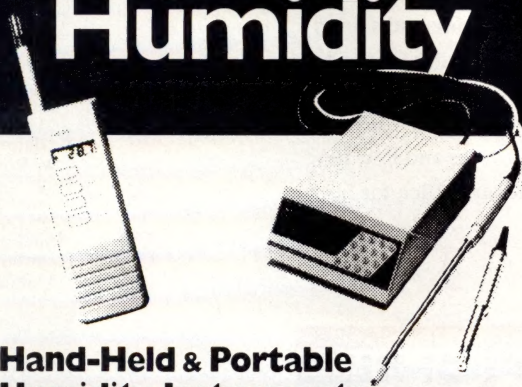
## OVERSEAS

**DSP Spring Design Conference, April 21-23**, Santa Clara, Ca, USA. Contact: Liz Austin, Miller Freedman, tel 0011 1 888 239 5563, email, [dsp-world@mfi.com](mailto:dsp-world@mfi.com) □

**IPC Printed Circuits Expo 98, April 26-30, 1998**, Long Beach, Ca, USA. Contact: Dan Green, IPC, tel 0011 1 847 509 9700. □



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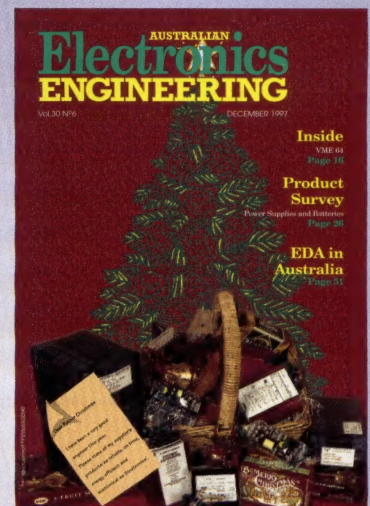


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## BEHIND THE COVER

**Statronics Power Supplies** has been accredited to ISO9001 for over 3 years. The system now includes TQM yielding over 99% total customer satisfaction. In turn, this achievement has provided a significant increase in direct and indi-

rect exports, competing in the world marketplace. The Custom and Standard product ranges are gradually obtaining CE Mark approval for Europe and boast exceptional "greenness" in the areas of EMC, safety and efficiency. The customer base spans from domestic defence through to exports for consumer products.





# New K6 beefs up multimedia

**A**MD hopes its new K6 processor will establish a "new world order" of alternative Windows-based platforms, giving it an opportunity to distinguish itself from Intel.

Forthcoming versions of the K6 will incorporate the company's new AMD-3D technology, which it says will "lead the way to visual computing platforms within the Microsoft Windows standard that deliver a near theatre-quality experience".

A recent report in the *Australian Financial Review* stated that the new 3D capabilities are said to offer performance beyond MMX, especially improving MPEG-2 video and surround-sound. The report said AMD has about 12% of the chip market, and Intel around 80%. □



The AMD K6 MMX Enhanced Processor



Sydney company Microelectronic was recently awarded the contract to supply the Sydney Light Rail System with its ticketing machines, and to integrate six operational functions through one central control room (pictured). One person in the control room can control the whole light rail system, including the closed circuit TV system, the radio communication with all trams, signal monitoring, PA system and traction power monitoring. □

## AIIA board for 1998

**T**he Australian Information Industry Association (AIIA) has chosen its board for 1998, headed by Alan Baxter of DMR Consulting Group.

Joining him on the board are Lyndsey Cattermole of Aspect Computing, John Gwyther of TUSC, Russell Bate of Sun Microsystems and Graham Henry of Andersen Consulting. Tony Robey of Wizard Information Systems is the new deputy chairman and Bruce Thompson of Hewlett-Packard is Treasurer.

During the recent AGM Alan Baxter spoke of the body's focus for 1998. "AIIA's first priority is to ensure that all that can be done to foster and enable the development of the digital, information or on-line economy is done. The benefits of the on-line economy will only be captured if Australian firms, governments and individuals are in the position to become a community of dynamic leading-edge users. □



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# Eye Diagram Triggering

## Set Up Eye Diagram Triggering Without A Symbol Clock

Eye diagrams are commonly used tools for analyzing communications systems. The traditional eye diagram setup, documented in figure 1, requires the I and Q data waveforms and the symbol clock.

The symbol clock is not always available. In such cases it is possible to create an eye

## Test and Measurement Solutions No 9

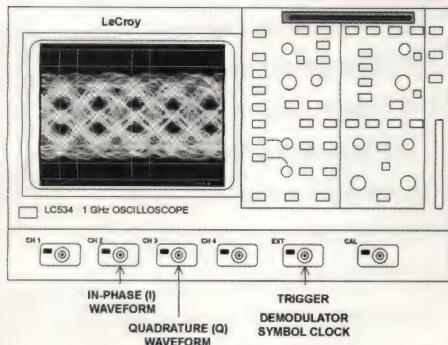


Figure 1 Connections for a traditional eye diagram requiring the I & Q waveforms and the symbol clock.

diagram by triggering on either of the quadrature signal components. This procedure will result in some degradation of the eye opening. In many cases it is quite suitable for "quick look" analysis of system performance.

Figure 2 shows an eye diagram where the trigger source is the I waveform. There are a few things worth noting in the trigger setup as annotated in the trigger setup icon on the bottom of the display. First, since the data edge transitions occur synchronously with the clock it is preferable to emphasize the edge transitions. This is accomplished by using low frequency reject (LFREJ) trigger coupling which high pass filters the waveform. Trigger level is then adjusted for the largest "eye" opening

Since we are triggered on the waveform itself the trigger delay is increased to view

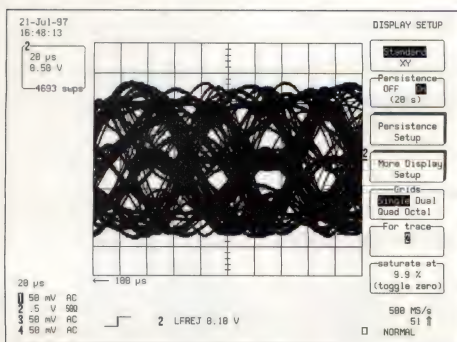


Figure 2 A self-triggered eye diagram.

the data about 100 us (5 divisions) into the waveform to assure the observation of random transitions.

Digital oscilloscopes, unlike their analogue counterparts, allow the user to control the display persistence. Analogue persistence is set for a 10 - 20 second time constant. This time constant controls the number of sweeps shown on the display. Analogue scopes

update faster but the persistence also decays faster. The 10 - 20 second time constant approximates the same number of sweeps on the trace as an analogue scope.

The analogue persistence "saturate at" control adjusts the range of intensity much like the intensity control on an analogue oscilloscope.

Sequence mode acquisition, which minimizes dead time between traces offers a more analogue-like update rate. In figure 3 the sequence mode is used, with 50 segments, to acquire the same data. When sequence mode data is displayed with persistence all acquired traces are overlapped. The display is updated in blocks of 50 traces with a noticeable decrease in the time required to create the eye pattern on the screen.

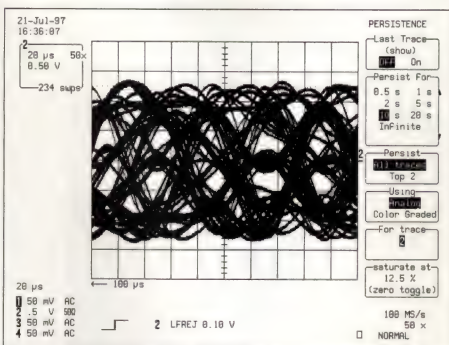


Figure 3 Using sequence mode acquisition.

All of these techniques can be used to view an eye diagram which derives its trigger source from the data waveforms. Users should spend the time to optimize each of the controls discussed for the particular type of waveform.

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## DISTRIBUTOR NEWS

**Backplane Systems Technology** has changed its mailing address to: P.O. Box 116 Berowra NSW 2081. The company has also opened a web site at [backplane.com.au](http://backplane.com.au), detailing its product range.

**Anritsu Wiltron** has changed its name to **Anritsu**, as part of the company's globalisation strategy. The company has also established the Asia Pacific Regional Operations division, which will work closely with the operations in Japan, America and Europe.

**Avnet Pacific** has created a special interest web site dedicated to providing component and applications information for electronic designers. Click on the EMI, ESD, EMC graphic at the site at [www.avnet-pacific.com](http://www.avnet-pacific.com) to link to a feature section on EMI/ESD. The section is continually updated with new developments, and a glossary and selection chart will assist in the selection of the right component for the noise and frequency of concern.

From December 1 **Comtest Laboratories** will have a new address: 1/570 City Rd, South Melbourne 3205. The new phone and fax are (03) 9645 5933 and (03) 9645 5944, respectively.

The Sydney office of **Tenrod** has moved to Unit 1, 24 Vore St, Silverwater, 2128. Telephone, fax, and Victorian office details remain the same.

**Precision Circuits** is now accredited to the Environmental Management System standard ISO 14001. The company says it is the first PCB manufacturer in Australia to achieve this accreditation, which controls the impact of the company's activities, products and services on the environment.

**Vicom Australia's** Melbourne office has moved to 1064 Centre Rd, Oakleigh Sth, 3167. Phone and fax: (03) 9563 7844, (03) 9579 7255. Email: [vicom@vicom.com.au](mailto:vicom@vicom.com.au).

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## Two-way paging

The world's first commercial two-way paging service was unveiled recently in Sydney. Using US technology, the TagNet Paging network was set up before similar ones in New York, Singapore and Moscow.

The enhanced network delivers automatic two-way communication to and from pagers to the Internet, email and telephones. Operators aren't required as a message can be generated and transmitted directly from the sender's PC to the receiver's pager. A receipt acknowledgment can be sent straight back to the sender's PC.

"The lack of functionality of one-way pagers has been a major disadvantage for a long time," said TagNet spokesperson Craig Taylor. The units are manufactured by Samsung using technology from Nexus Corporation. Major commercial markets are expected to be the medical, transport and hospitality industries. □



Sydney users are the first in the world to get access to two-way paging.

## IPC Designers Council in Oz

The Surface Mount and Circuit Board Association (SMCBA) recently signed an agreement with the IPC Designers Council to establish the first chapter of the council in Australia and New Zealand.

The Designers Council was established to encourage the exchange and integration of design concepts concerning PCBs and related technologies, through seminars and workshops. Through this

it aims to play a significant role in standards development, improve education opportunities for designers, and to raise the profile of the profession.

Andrew Pollock, executive officer of the SMCBA in Victoria, said the agreement will provide significant benefits for SMCBA members, including member prices for IPC publications and events, and the chance to provide input to the development of design standards. □

### Micropower 12-Bit A/D for Portable Applications

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## Vision needed for high tech success

Australia needs a new vision to provide the impetus to spawn a high technology industry sector, according to speakers at a conference, *Financing SME Innovation for profit*, run by the Warren Centre for Advanced Engineering.

Macquarie Bank executive director Daniel Phillips said there is a huge gap between investors and technology owners in terms of their outlooks. Technology owners come from a science or engineering background, look to the long term and are optimistic and enthusiastic. Investors are usually from legal or accounting backgrounds and are looking for short-term returns on their investments. Phillips said investors essentially back the people involved in the project rather than the technology so the best technology doesn't always get the money.

Craig Lawn, a partner at Price Waterhouse Technology, pointed to a lack of incentives for investors. He said Australia's high capital gains tax penalises entrepreneurs and foreign investors. Individuals are taxed at 48.5% and companies at 36% and foreign investors are liable to pay this tax. By comparison, foreign investors in the US do not have to pay tax, the rate is capped at 28% and only applies after more than one year. In Singapore and Malaysia there is no capital gains tax.

Dr Gordon Murray from the University of Warwick in England commented that there are plenty of informed investors in the US but this was not so in Europe or Australia. He suggested that for Australia to reap the rewards of wealth creation from high-tech companies, the Howard government must collaborate with industry in much the same way the Clinton administration and investment sectors support new technology ventures in the US.

Former Science and Technology minister Peter McGauran said that in Australia, attracting venture capital has historically been a protracted and time consuming process and Australian industries have had limited success to date in accessing global markets. He said the government is aware of the urgent need to establish and promote a local venture capital industry □

### CORRECTION

On pages 56 to 67 of the November issue of *AEE* was a listing of various brands of electronic components and the companies who distribute those brands. The following brands should have been listed as being distributed by **Avnet Pacific**:

- Microchip
- Motorola
- National Semiconductor
- Seiko
- Protek Devices

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			$V_{GS} = 4.5V$	$V_{GS} = 2.5V$
20-V n-channel TrenchFETs optimized for operations at low $V_{GS}$ are used for switches in Li-Ion batteries	Si4466DY	single/N-Ch.	0.009	0.013
	Si4966DY	dual/N-Ch.	0.020	0.030
	Si3446DV	single/N-Ch.	0.035	0.060
	Si6466DQ	single/N-Ch.	0.014	0.021
	Si6966DQ	dual/N-Ch.	0.035	0.050
20-V p-channel TrenchFETs optimized for operations at low $V_{GS}$ are used for load switches in cell phones and notebook PCs	Si4463DY	single/P-Ch.	0.014	0.020
	Si4963DY	dual/P-Ch.	0.033	0.050
	Si3443DV	single/P-Ch.	0.065	0.100
	Si6463DQ	single/P-Ch.	0.020	0.030
	Si6963DQ	dual/P-Ch.	0.045	0.090
20-V n & p-channel MOSFETs pairs	Si4562DY	N-Ch. } pair	0.020	0.030
		P-Ch. }	0.030	
	Si6544DQ	N-Ch. } pair	0.035	0.050
		P-Ch. }	0.045	

DY = SO-8, DV = TSOP-6, DQ = TSSOP-8

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# The VME64 Extension Standard

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Wade Peterson looks inside the latest version of the VME standard. VME64X is bigger and better.

---

The original VMEbus specification, published in 1981, met the needs of industrial users well enough to become the dominant 32-bit backplane bus. However, by the early 1990s its 32-bit-wide data path was seen by some as a bottleneck. In 1994 the VMEbus International Trade Association (VITA) published an upgraded specification called the VME64 standard. It doubled the data transfer rate by multiplexing the address and data buses. VITA members have now developed further enhancements and VITA has published these in the VME64X standard. It recently underwent the final balloting process at VITA, and has been approved as VITA 1.1-1997. It is now being reviewed by ANSI for approval as an ANSI standard. Many manufacturers are already delivering VME64X products, and a variety of VME64X bus modules, front panels, backplanes, connectors and card racks are now available.

## What is VME64X?

VME64X is the result of three years of hard work by the VITA Standards Organisation (VSO). VME64X is a superset of both the VME and VME64 standards. It also depends greatly on mechanical parts which are specified in the IEEE 1101.10 and 1101.11 standards. VME64X adds many new features to the VME64 architecture. These include:

- A new 160-pin connector family
- A new 95-pin 10/10 connector
- 141 more user defined I/O pins
- Rear I/O transition modules
- Injector/extractor locking handles
- EMC (electromagnetic conformance) front panels

- Better ESD (electrostatic discharge) protection
- Board keying capability
- 3.3 Vdc power supply pins
- More +5 Vdc power supply pins
- Geographical addressing
- Expanded CR/CSR register definitions
- A new 2eVME bus cycle (up to 160 Mbyte/sec)
- Support for live-insertion (hot-swappable) bus modules
- A test and maintenance bus

## Compatibility of VME64X modules

Longevity is very important in the micro-computer board industry, especially among industrial, military and telecom users. For example, some military development projects can take as long as five years to complete, and the resulting system can have a service life of 20 years or more. Hence, a great deal of effort was put into ensuring the forward and backward compatibility of VME64X products. The VME64X architects wanted to make sure that older VMEbus and VMEbus boards would still work in the new system. All legacy VMEbus and VME64 boards are forward compatible to VME64X backplane and card racks, allowing these older boards to be plugged into the newer systems.

In general, the reverse is also true. VME64X boards are backward compatible with older backplanes and card racks. For example, the new 160 pin connectors can be plugged into the 96-pin sockets on older VMEbus and VME64 backplanes. However there are a few exceptions to this. For example, if a VME64X board requires the 3.3 Vdc power pro-

vided by a VME64X backplane, it will not work in an older backplane because older backplanes don't have the connector pins needed to provide this power.

## Features required for VME64X compliance

The VME64X standard insists that a basic set of features be present on boards and backplanes before they can be called VME64X compliant. All other features defined by the standard are considered optional. To be called VME64X compliant, a 6U backplane must:

- have 160 pin connectors
- have all defined ground pins connected to its on-board groundplane
- consist of a single, monolithic printed circuit board, with both J1 and J2 connectors
- include geographical address pins
- route and terminate all VME64 and VME64X bused signal lines
- distribute 5V, 3.3V, 12V, V1, V2 and VPC.

The VME64X specification does not require 6U backplanes to support rear-access I/O pins on the J2 connector. However, if it does support rear access, it must comply with the IEEE 1101 - I rear I/O transition board standard. That standard extends some of the J2 and JO connector pins at the back of the backplane. These pins provide a neat interface for I/O cables (or transition modules) behind the backplane.

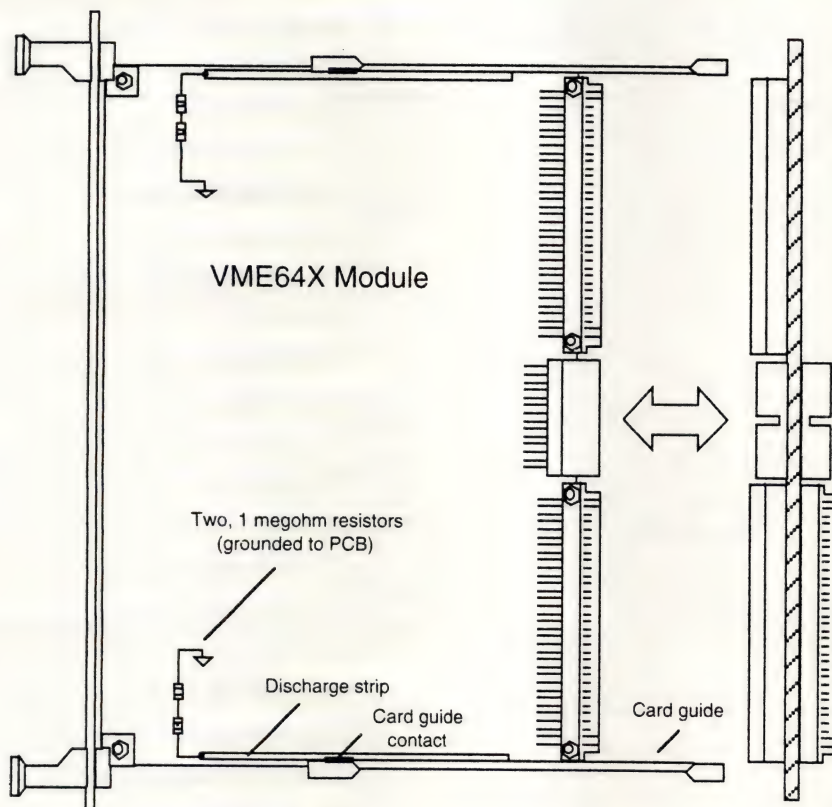
## Compatibility issues with the 160-pin connector

The 160 pin connector is 100% forward and backward compatible with the 96-



[illegible]





pin DIN 41612 connector. For the most part, VME64X boards are able to plug into legacy backplanes. Of course, the additional functionality provided by the new connector plane will not be available, because these pins are not connected to the backplane. Since the basic functionality is still provided, this is generally not a problem. However, there are still some important compatibility issues. For example, if the board requires +3.3 Vdc power, then it will not function in a VMEbus or VME64 backplane. Users should be aware that the VME64X standard does allow manufacturers to design boards that require a VME64X backplane. When purchasing a VME64X board for use in a VMEbus or VME64 backplane, you should check with the manufacturer, to make sure it will work.

### EMC Front Panels

The VME64X specification also allows

for EMC (electromagnetic compliance) front panels. These help prevent electromagnetic waves from entering or leaving the VMEbus chassis through the front panel area. They are detailed in the IEEE1101.10 specification, and have three major new components: an EMI gasket; a reliable ground; and optional solder-side covers.

EMC performance has become a major issue for systems integrators. Since 1996, in Europe, and 1997 in Australia, laws have required that all electronic products conform to EMC regulations. These limit EMI emissions and EMI susceptibility. The front panels on VME64X boards should always be grounded to the card rack — never to the ground plane of the printed circuit board. This eliminates ground loops, and reduces the hazard of electrostatic discharges. Older style VMEbus front panels do not necessarily make a good, positive ground contact to the card rack. That's because:

- There was no requirement in the VMEbus or VME64 standards that a good electrical contact be provided between the front panel and the card rack.
- If the front panel screws aren't tight, there is sometimes a gap between the back of the front panel and the face of the card rack.
- Some VMEbus board manufacturers anodise their aluminium front panels.

This creates an insulating oxide layer on the surface of the aluminium, thereby increasing the resistance between the front panel and the card rack.

### ESD Protection

There are two features in the VME64X specification that help solve electrostatic discharge (ESD) problems: better grounding of the front panels and an ESD strip. Most of us have encountered electrostatic discharges. In dry climates you often get a small spark that jumps from your finger when you touch a metal object such as a door knob. The voltages can be surprisingly large. If you can make a spark jump from your finger, it has a potential of at least 2000 volts. ESD discharges can easily reach 10,000 volts, and have been measured as high as 40,000 volts. If this high voltage energy reaches a sensitive component on the printed circuit board, it can disrupt (or even damage) the board. If a VMEbus front panel is not grounded to the card rack, touching the front panel with your finger might cause a spark to jump from the front panel to the circuit board, thereby disrupting or damaging the board.

The new ESD front panels prevent this problem by providing a reliable, low-resistance ground path to the card rack. In some VMEbus applications it is also necessary to bleed static charge from a board prior to its insertion into the card rack. One example is telecom applications, where live insertion is necessary. The VME64X specification provides for the discharge of a board as it is inserted into the card rack. This is done using a discharge strip and card guide contacts, which are located at the top and bottom edges of the board. The discharge strip is simply a plated area on the component side of the printed circuit board. It is connected to the printed circuit board ground layer through a pair of one meg current-limiting resistors connected in series. With two resistors in series, one of the resistors will still provide current limiting in case the other resistor arcs over, due to a very high voltage static charge.

When the VME64X board is inserted into the card rack, the discharge strip makes contact with a card guide contact which is connected to the card rack ground. The discharge happens very fast — typically within a few hundred milliseconds. This ensures that the board is fully discharged by the time the connectors engage the backplane. When the rack is fully inserted into the rack, the card guide contact disconnects from the discharge strip. This eliminates any potential ground loops that might form between the logic and frame grounds.

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## Additional power resources

There are three additional power supply voltages available on VME64X. They include:

- 10 new +3.3 Vdc power pins
- 3 additional +5 Vdc power pins
- 2 new 48 Vdc power pins

The 10 new +3.3 Vdc pins can be used to supply up to 12 amps of power to each plug-in board. These pins were added because of the many new low voltage logic ICs that are being introduced. (In VMEbus and VME64 systems, the +3.3 Vdc had to be generated by on-board voltage regulators.) All of these pins are located on the P1/J1 connector, so the additional 3.3 Vdc power is available for both 3U and 6U boards.

Three additional voltage precharge (VPC) pins are available. The VME64X backing pin on the backplane is either tied to the system's 5 Vdc power supply. These pins are intended for precharging the on-board bus transceiver during hot swap operations. In applications where the system is powered down before the boards are swapped, these pins can be used to provide additional +5 Vdc power to boards with unusually high +5 Vdc

current requirements.

New pins ( $\pm V1/V2$ ) were added to the P1/J1 connector to provide high voltage DC power to the board plugged in parallel, to provide a 48Vdc battery power for telecom users. However, the VME64X standard also allows these pins to be used for any voltage between 38 and 75 Vdc.

## Geographical Addressing

Six pins in the new 160 pin connector are used to support geographical addressing. Geographical addressing allows each plug-in board to determine its own slot number in the backplane. This feature has always been lacking in VMEbus and VME64 systems. Geographic addressing allows a systems integrator to ensure that the various boards are each installed in the correct backplane slot, the correct software is loaded into each board, and the boards are plugged into a VME64X backplane.

The on-board systems controller functions are enabled only if that board is inserted into slot 1. A five-bit address is encoded into each slot in the backplane. A sixth bit is used for parity. Each address pin is either tied to ground or left floating (ground = logic 1). Pull-up resistors

on the plug-in board convert this into a logic high or a logic low signal. Onboard logic then inverts the signal levels, and reads them as binary code. A pull-up resistor is used because it allows each plug-in board to determine whether it is plugged into a VME64X backplane, or a VMEbus/VME64 backplane.

If the board detects a slot number of zero (all of the pins are floating) then it knows that it is plugged into a VMEbus or a VME64 backplane. If it detects a slot position from 1 to 21, it knows it is plugged into a VME64X backplane. When a VME64X board discovers that it is plugged into a VMEbus or a VME64 backplane, it ignores the signal levels on its 'z' and 'd' row pins. Geographical addressing allows the system software to verify that each board is in the correct slot. In addition, geographical addressing allows multiple identical processor boards to be equipped with identical EPROMs. Without geographic addressing, each processor in a multiprocessing system would need to have a unique set of EPROMs. With geographical addressing, each processor board can discover its backplane position at boot-up time, and then modify its behaviour appropriately. □

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# DSP Enhances VXI Architectures

Ron Klopfer, Spectrum Signal Processing Inc.

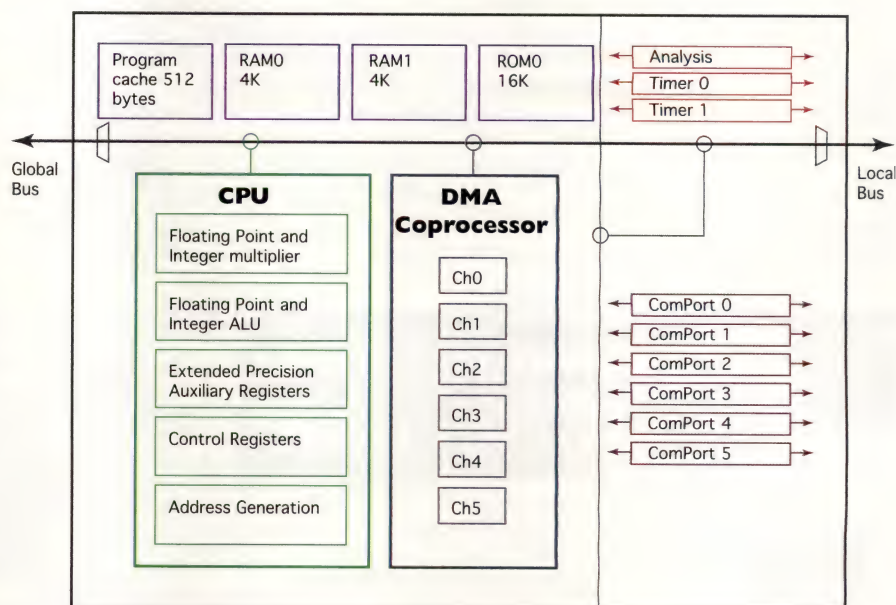
In the ten years that have passed since its inception, VXI has become widely accepted as a superior signal test, analysis and processing environment. The list of available VXI hardware and targeted applications has burgeoned. Today's VXI-based systems are being deployed to address requirements in the aerospace, communications, medical imaging and industrial markets. The increasing complexity of such VXI systems, coupled with continuing improvements in signal acquisition performance, have underscored a need for VXI-based high performance digital signal processing.

## VXI overview

VXIbus was introduced in 1987 by a consortium of test and measurement companies to address the needs of portable applications and to provide a standard modular architecture for data acquisition and test systems. It builds on the VME computer bus specification by offering improved I/O system extensions. These were much in demand by manufacturers of high-performance instrumentation and data acquisition systems. The result is a level of I/O throughput and signal integrity that is unprecedented in the VME world.

One of VXI's biggest benefits stems from the fact that it is based on an open standard, and as such is supported by hundreds of hardware and software vendors. It is highly modular and can be re-configured by individual vendors to suit their needs. This allows the user to select the most appropriate digitiser, waveform generator, switch, amplifier, meter, controller or signal processor from the myriad of available VXI instruments.

For these reasons, VXI has become a popular environment in such application areas as automated test, vibration analy-



Architecture of the C40 DSP

sis, simulation, telecommunications and process monitoring and control.

## VXI support for signal processing

VXI systems provide a robust and rugged data acquisition environment. VXI modules are electro-magnetically shielded, and have strictly specified power and cooling requirements. For these reasons, VXI boasts the ability to route signals with high speed and integrity, and analog-to-digital conversion to resolutions in excess of 20 bits is common in VXI. This data is moved within the VXI system in two ways:

- **VXI Bus** - a 32 bit VME-compatible bus, providing up to 40 MB/s bandwidth,
- **Local Bus** - a set of lines supporting analog or digital communication between

sets of modules in a "daisy-chain" fashion.

The local bus is generally used to move data locally at high speed without interfering with system-wide communication taking place on the VXI bus. Several high speed local-bus protocols are in common use, offering upwards of 100 MB/s of throughput between VXI modules. All summed, the VXI system has the capacity to move vast amounts of high-resolution data, and hence makes a perfect niche for high-end signal processing hardware.

## DSP Technology

The Digital Signal Processor (DSP) is a class of microprocessor designed specifically for real-time signal processing, particularly where the processor is tightly coupled to high-performance I/O. In this



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**Detector Switch**



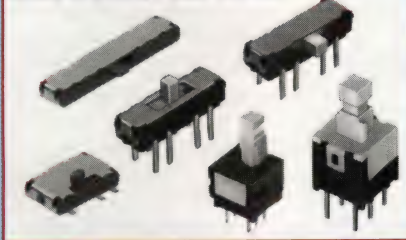
**Over Stroke TACT Switch**



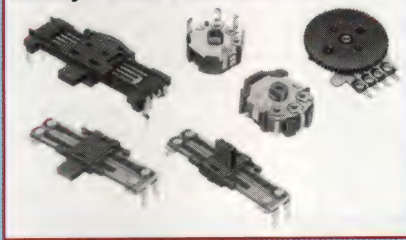
**Trimmer Potentiometer**



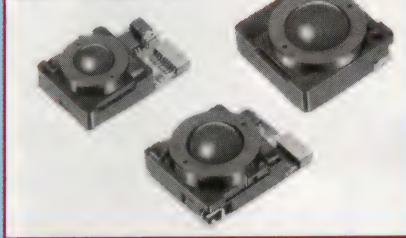
**Slide Switch/ Push Switch**



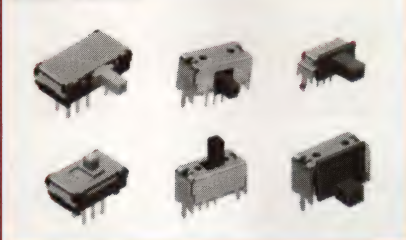
**Rotary / Slide Potentiometer**



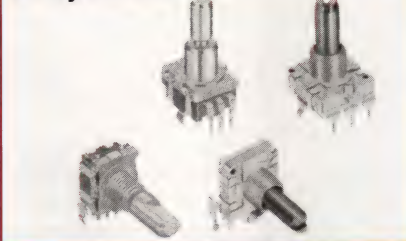
**Micro track ball**



**Slide Switch**

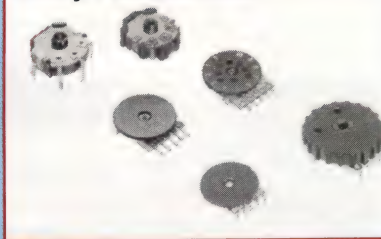


**Rotary Encoder**

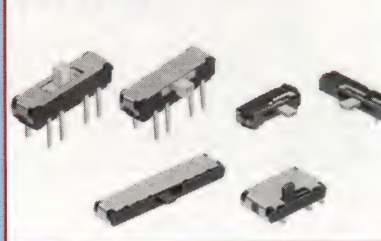


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**Rotary Potentiometer**



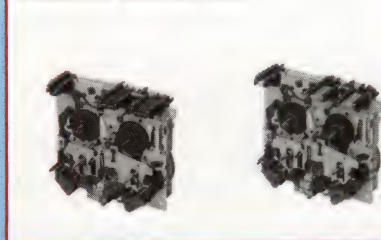
**Slide Switch**



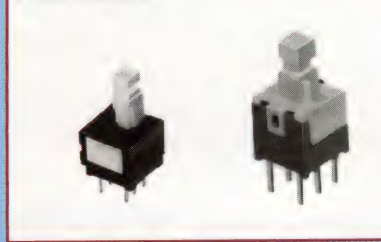
**TACT Switch**



**Cassette Mechanism**



**Push Switch**



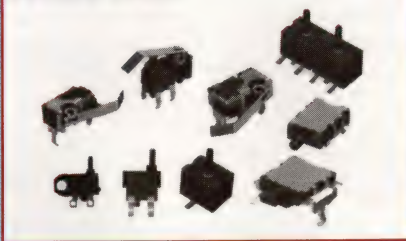
**Linear Position Sensor**



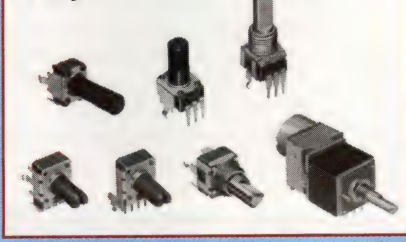
# ALPS

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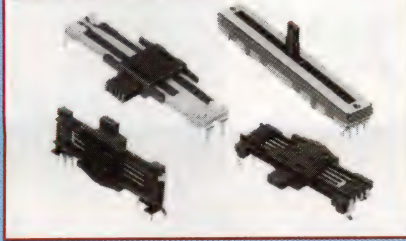
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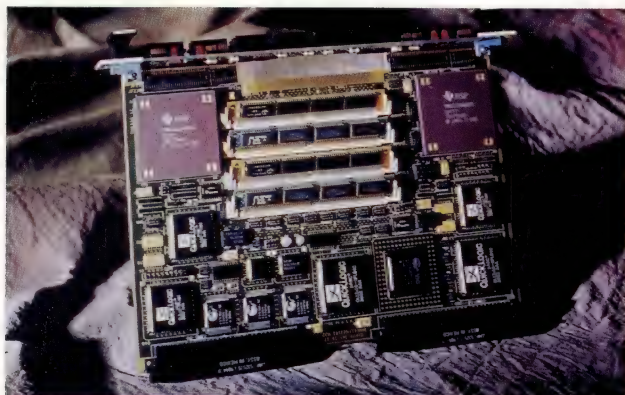
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A modular, scalable C40-based VXI board.

regard, it differs from conventional CISC or RISC processors; the DSP's architecture is highly optimised to respond to I/O quickly and to move this data at very high throughputs. Several structural features of the DSP make it a superior signal processing engine:

- Multiple high speed data/memory busses,
- Various flexible I/O interfaces and on-chip I/O peripherals,
- Optimised instruction set for fast, parallel signal processing arithmetic,
- Fast interrupt response to I/O events,
- Ease of C or assembly programming,
- Support for glueless multiple-DSP configurations.

This last capability of the digital signal processor to operate in a multiprocessing configuration is particularly advantageous in the VXI environment. VXI systems vary vastly in their processing requirements, and demand a signal processing element that is able to scale accordingly. In particular, in VXI systems with large channel counts or high data rates, the processing requirements often exceed the capabilities of a single DSP device. Processors not designed for parallel processing are inadequate for the task because interprocessor com-

munication quickly saturates device I/O and degrades computational efficiency. Several DSPs currently available possess on-chip support for scalable multiprocessing, the most popular of which is the Texas Instruments

TMS320C40. In fact, The C40 DSP exhibits all of the properties described above that make digital signal processors a good fit with VXI, and hence makes a good example for

further discussion.

### The TMS320C40 DSP

The C40 is one of five generations in the TMS320 family of digital signal processors from Texas Instruments. The C40 builds on the very popular C30 family of DSPs to provide a high performance floating point processor geared towards parallel processing applications. The C40 offers 60 MFLOPS (million floating-point operations per second) of 32 bit floating performance. The processor provides two independent 32 bit memory interfaces, each delivering upwards of 100 MB/s of throughput. In terms of real processing performance, a single C40 is capable of maintaining:

- a continuous 100-tap FIR filter, on a 300 kHz input stream, or
- a continuous 512-point FFT, on a 1.5 kHz input stream, or
- a continuous 1024 point correlation, on a 28 kHz input stream.

The C4x generation of DSPs incorporates on-chip hardware to facilitate high-speed interprocessor communication and concurrent I/O without interfering with CPU performance, as illus-

trated in Figure 1. These communication ports are each capable of 20 MB/s of throughput, and are the key feature of the DSP's architecture facilitating glueless parallel processing. The ports serve as point-to-point links between processors, eliminating the need for a complex shared memory parallel processing scheme. Communication ports on various C40s can be interconnected to build up a parallel processor network of unlimited scale or topology. Alternatively, communication ports can be used as an I/O interface. Each of the C40 communication ports is associated with an on-chip DMA controller, each of which support full bandwidth interprocessor communication or I/O without burdening the CPU.

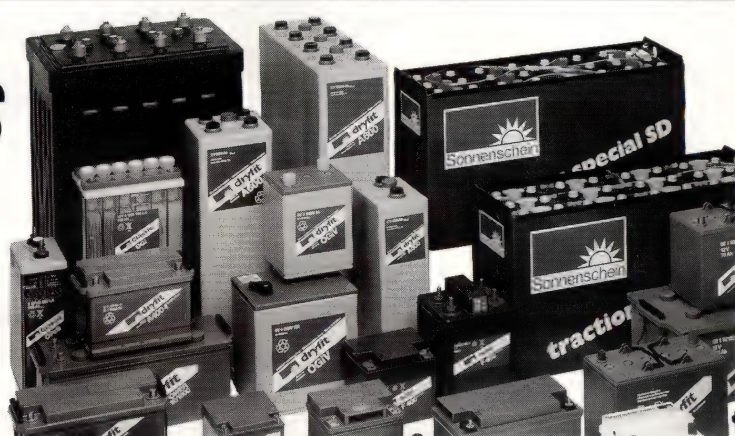
Given a DSP with the flexible multiprocessing capabilities of the C40, the natural evolution is a module standard that supports the configuration of multiple C40s at the system level. The TIM-40 standard, developed by Texas Instruments in conjunction with various third parties, is an open specification tailored specifically for the C40 processor. The TIM standard describes a physical module roughly four inches by two inches, populated by one or more C40 processors, memory of various types and configurations, and possibly some form of peripheral or I/O interface. The basic TIM-40 module is depicted in Figure 2. The TIM module brings all six of the C40's communication ports to the module connectors allowing C40 DSPs on various modules to be interconnected in a parallel processing network.

Since the inception of the TIM-40 standard, a wide variety of modules have become commercially available, including dual-C40 modules, video capture and processing modules, large DRAM modules, high-speed serial I/O modules, digital radio receiver modules, and even

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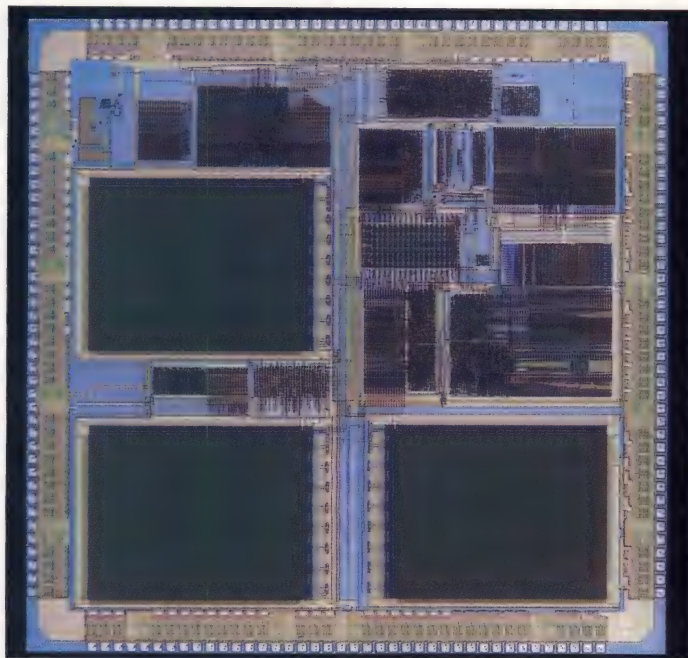
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The core of DSP — a 0.5µm ASIC.

FPGA-based reconfigurable-computing modules. In a typical system, one or more TIM modules will be placed on a carrier board that provides sites for several

modules. The carrier board will support some mechanism to interconnect the C40 communication ports between the various modules. The carrier board also generally provides interfaces to standard computer busses and may also provide access to shared resources such as memory or I/O.

By populating a chosen carrier board with a set of TIM-40 modules appropriate for the given application, one can easily configure an application-specific single-board multi-

ple-DSP system. It is exactly this degree of flexible, scalable parallel signal processing that high-performance VXI systems are demanding.

## Merging the technologies

The need for scalable digital signal processing in VXI systems is no secret, and several hardware manufactures are addressing this requirement in the form of single-DSP VXI modules. However, the ever-increasing processing demands of VXI systems is fuelling a movement to scalable, multi-processor solutions. For example, a VXI module containing two C40 DSPs and sites for up to six TIM-40 DSP modules has recently become available, as the result of a joint R&D project undertaken by Spectrum Signal Processing and Hewlett Packard. Figure 3 describes the architecture of this board. The configuration will support up to 14 C40 digital signal processors in a single VXI slot, all with access to the VXI bus, local bus, and various shared resources. For even higher performance, the scalable nature of the C40 DSP allows the parallel processing network to grow beyond the capacity of the single VXI board, since DSPs on various boards can be interconnected via communication ports. It is this level of scalable signal processing that will allow VXI to meet the requirements of tomorrow's high-performance applications. □

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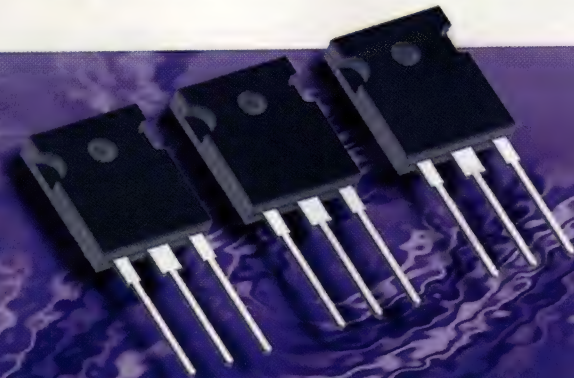
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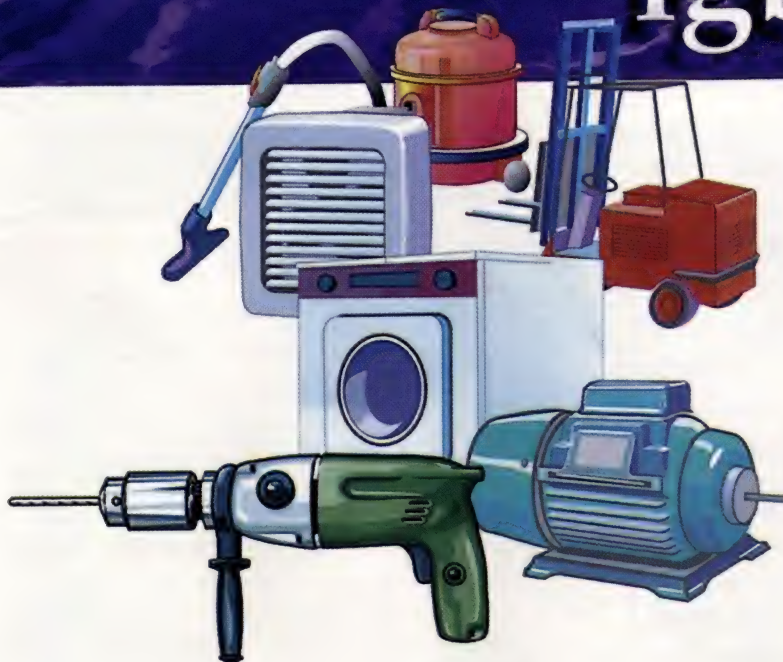
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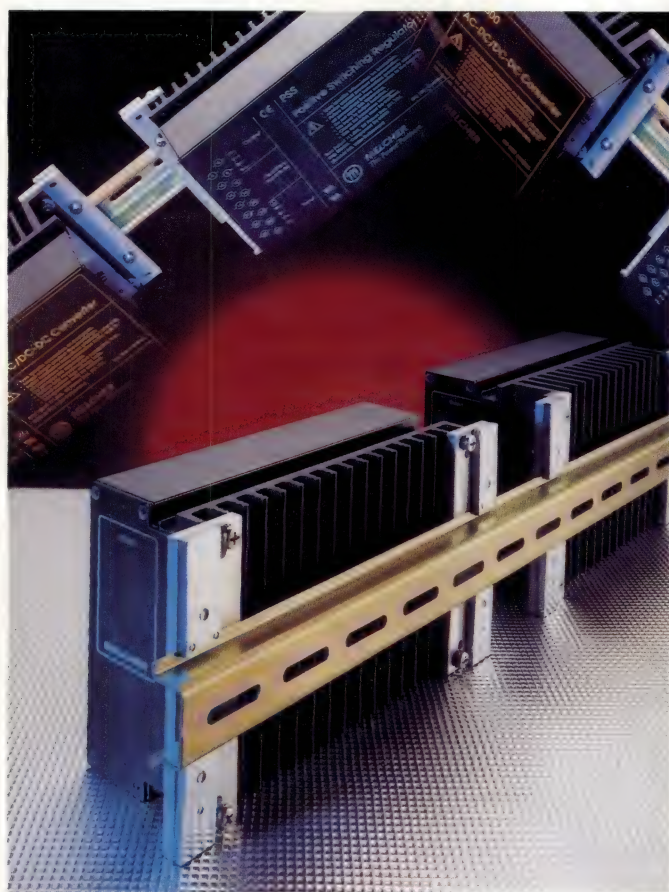
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# Power supplies & batteries

This month's product survey features the latest products in the field of power supplies and batteries. For more information on any item, phone or email the distributor direct.



## Chassis or DIN rail mounting adaptor

Scientific Devices has available two new accessory kits from Melcher. The HZZ00615, DMB-K/S kit permits mounting of the S, K PSS and PSK converters to the DIN rail. This type of installation technique is becoming more popular due to reduced cost and space requirements. The kit consists of two brackets for mounting on each side

of the unit, including a clamp which is screwed tightly to the DIN rail.

The HZZ00616, CMB-S kit allows for chassis mounting of the S and PSS converters if the access is only possible from the front of the chassis, in conjunction with the new modified type of heat sink with integrated tapped holes. As a consequence, Cooling and Mounting Plate are only necessary when space conditions are very tight. Otherwise the kit can be used without altering the unit.

Further enquiries to: (03) 9569 1366.

## Integrated voltage supervisor

Available through ACD, Texas Instruments' TPS7330 is an integrated voltage supervisor and low dropout regulator designed for 3.0V systems. It is a simple solution for systems needing both longer battery life and a supply voltage supervisor.

The device is optimised for power sensitive applications such as cellular phones, personal digital assistants, digital cameras and other low power portable systems.

It features extremely low dropout voltage and quiescent currents made possible by replacing the conventional bipolar PNP pass transistor with a PMOS element.

Further enquiries to: (03) 9762 7644.

## Battery for KG109 radios

Imark Communications has released a low-cost nickel cadmium battery pack for the Kyodo KG109 portable radios. The NC1000A battery is made in Asia and is identical to the genuine Kyodo battery. It incorporates an inbuilt thermal fuse, and diode protection on the charging contacts. Capacity is in excess of 1000mAh at 9.6V.

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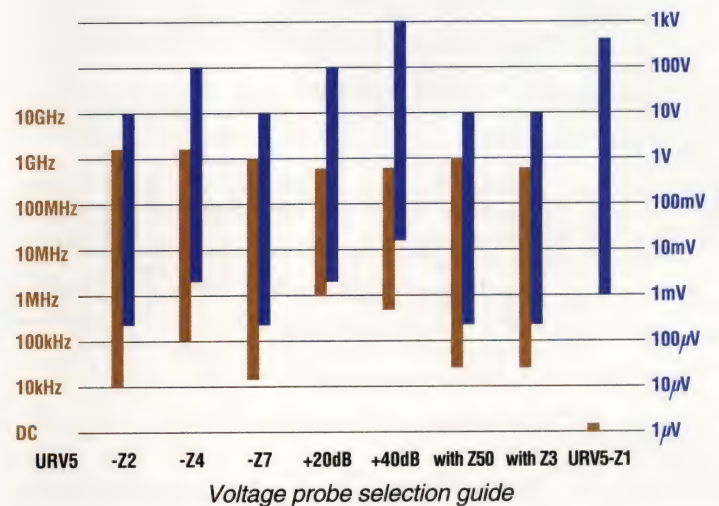
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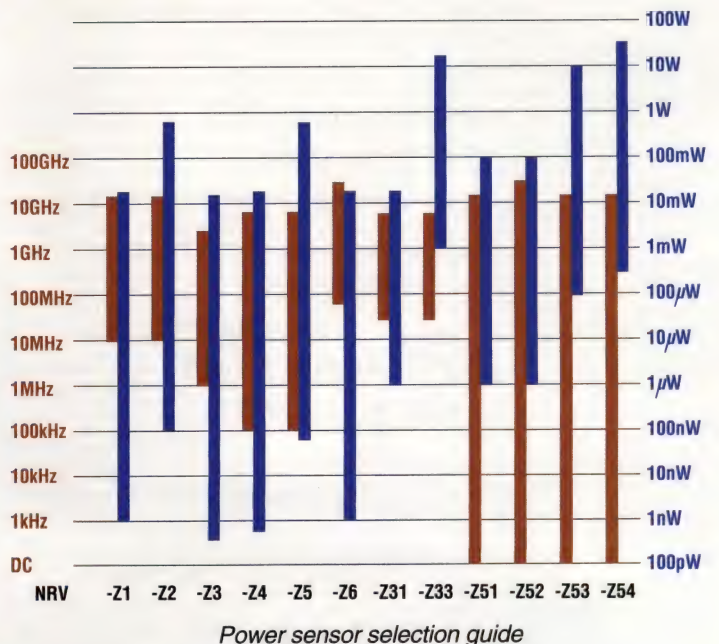
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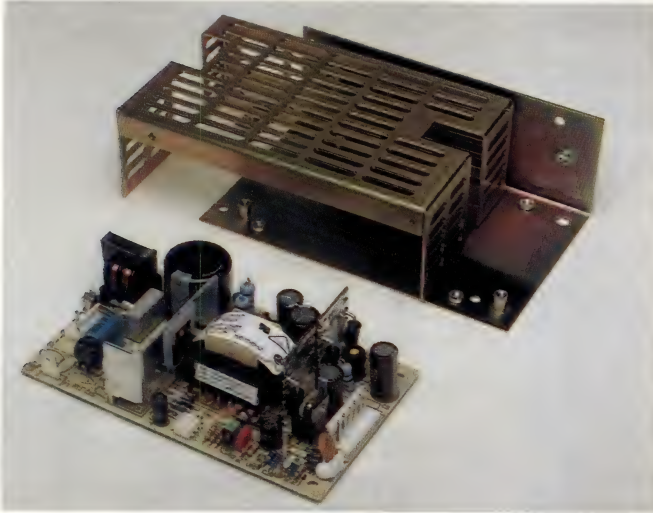
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## Enclosures for computer power supplies



Amtex Electronics is offering vented metal enclosures for the 25 and 40W NFS and NAL series power supplies for computer products. Designed to enhance safety and EMI characteristics of the supply, the enclosures have tapped standoffs to assist in mounting the power supplies. Input and output cable assemblies are also available.

Further enquiries to: (02) 9809 5022.

## Switch mode power converters

Rojone is introducing Pascall's new range of switch mode dc-dc and ac-dc power converters. Included are the PM series of single, dual or triple outputs 30 to 500W, the CL series of single or triple outputs 50 to 100W, the VM series of triple or quad outputs 100 to 400W, the ID/RA series of single or triple outputs 50 to 100W, the HD series of single or dual outputs 15 to 30W with industry standard footprint, and the VR series with a single output 50 to 400W.

Further enquiries to: (03) 9574 9300.

## High efficiency power controllers

Now available from Braemac are Temic Semiconductor's Si786CG and Si9130CG controllers, which are replacement options for the MAX786 dual output power controller.

Both devices contain two step-down controllers and two micropower linear regulators. The Si786CG is a pin-compatible and functionally equivalent drop-in

replacement for the MAX786, and the Si9130CG omits comparator circuitry that goes unused in many systems. Instead, it provides a pin-programmable output for the second converter, allowing designers to choose between 3.3, 3.45 or 3.6V for one of the two outputs.

The new controllers convert 12V battery pack energy, or the 18 to 24V output of an ac-dc wall converter, to the 5V and 3.3V supply voltages that notebook computers use.

Further enquiries to: (02) 9550 6600.

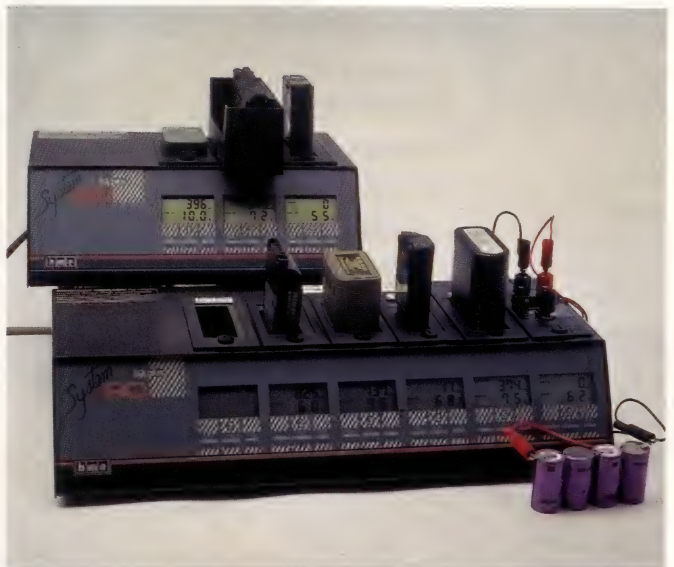
## Step up/step down switching regulator

INSIGHT has available Analog Devices' ADP3000 step up/step down switching regulator, that operates from an input supply of 2 to 12V in boost mode, and up to 30V in buck mode. An adjustable and three standard fixed-output versions are available for 3.3, 5 and 12V. The 3.3V version can deliver an output current of 100mA at 3V from a 5V input in step down, and 180mA at 3.3V from a 2V input in step up configuration.

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Further enquiries to: (03) 9761 3455.

## Battery recharger adaptors



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**Marconi 4220** - easy to use, Windows operated, high speed, manufacturing test system.

If you want to keep up to speed in the world of manufacturing test, you need to stay in touch with the latest advances.

Designed to ensure higher board throughput, the new Marconi 4220 PCB tester provides analog and digital in-circuit testing with up to 2048 test points. But that's only the beginning. With additional capabilities such as cluster testing, Boundary Scan and Marconi's unique Q-Test system, the 4220 widens the net, extending test visibility into non-contactable board areas.

Ensuring improved time to market and greater cost effectiveness, the 4220 is very easy to use.

Controlled through Windows 95 or NT, its straightforward interface makes life a lot simpler for programmers and operators alike.

Throughout its working life, the 4220's accuracy is guaranteed by an automatic self-calibration facility. And of course, you can always rely on the total support of one of the world's leading suppliers of test equipment.

If you want to be quicker - across the board - contact your nearest Marconi Instruments' office today or visit our website.

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E-mail: [ate@marconi.com.au](mailto:ate@marconi.com.au)

Website - <http://www.marconi.com.au>



## PRODUCT SURVEY

### Smart battery capacity monitor IC



Reptechnic has available Benchmark Microelectronics' bq2945 Gas Gauge IC for capacity monitoring of rechargeable battery packs. It supports version 1.0 of the SMBus and version 1.0 of the Smart Battery Data specifications, and can interface with the host system and battery charger to form a comprehensive battery management system that is chemistry independent.

The device also broadcasts warning messages, battery charging requirements, and "battery full" charge indication to the host or charge controller.

Further enquiries to: (02) 9953 9844.

### Improved Ni-MH cells

Braemac is offering Toshiba's new Ni-MH batteries which they claim have almost twice the capacity of equivalent size Ni-Cad cells. Recent improvements in technology have resulted in discharge currents as high as 3Cma, and recharge times down to one hour, using fast-charge techniques. Charge/discharge cycles exceeding 500 times can still be obtained.

Further enquiries to: (02) 9550 6600.

### Supervisory circuit

INSIGHT has available Analog Devices' AMD708ARM low-cost  $\mu$ P supervisory circuit for monitoring +5V supplies/batteries and microprocessor activity. It is the first of the AMD70x family to be available in a tiny 8-pin  $\mu$ SOIC package (half the area of an S0-8). It provides a pre-trimmed

4.4V power-fail reset, manual reset de-bounce, and reset pulse generator for a microcontroller. It requires no external components and draws only 200 $\mu$ A

of quiescent current. It can be used in all kinds of microcontroller applications, including printers, modems, PC set top boxes, drives, telecom cards, routers etc and is well suited to mobile applications.

Further enquiries to: (03) 9761 3455.

### Triple video amplifier

Analog Devices has announced a new triple video amplifier chip featuring high output current and single-supply operation. Available through HarTec, each amplifier is capable of driving up to 12V output, up to 70mA of current, and can do so into high capacitive loads. Designed for various video applications, the AD8023 amplifier offers gain flatness of 0.1dB to 10MHz, a differential gain error of only 0.06 per cent and differential phase error of just 0.02 degrees.

Designers have a choice of power supply options that includes a +5V single supply, or dual supplies of up to  $\pm 7.5$ V, with a maximum current consumption of just 10mA. Each amplifier's unity gain bandwidth is 250MHz and the slew rate is 1200V per microsecond. Even when driving loads of as much as 300pF capacitance, these amplifiers settle to within 0.1 per cent in only 35 nanoseconds.

Further enquiries to: (03) 9268 9000.

### Firmware upgrade for Voltech



Westek Industrial Products has available a Firmware upgrade for the Voltech PM 3000 and PM 3300 to permit power transformer loss measurements. The new transformer test mode allows all calculations as required by IEC76-1 and IEEE C57. These include the no-load losses, corrected for waveform, at a given temperature and the no-load loss factor. In the case of PM 3000A, the results are displayed on the front panel. For the PM 3300, results can be both displayed on the instrument's screen and printed by the in-built printer.

Further enquiries to: (03) 9369 8802.

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# WHATEVER THE NEED!

**LAPTOPS** - Premier Batteries range of computer laptop batteries are direct replacements in Toshiba, Compaq, NEC, IBM, ACER, Sharp and Macintosh computers. Batteries are fitted with the latest nickel metal hydride cells giving performance and running times equal to or better than the original product.



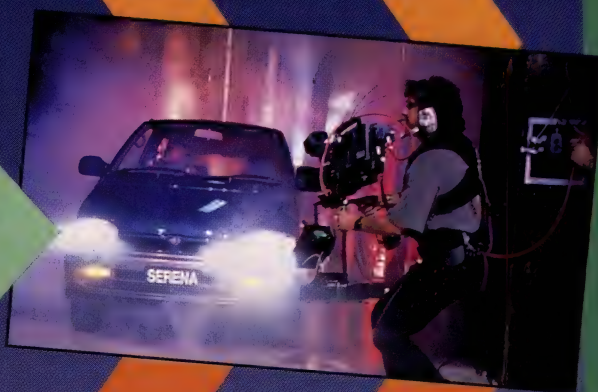
**TWO-WAY** - Two-way batteries encompassing a range of more than 65 models are currently available as off the shelf stock items. The broad requirements of the Australian communications market combined with increased production and manufacturing facilities has allowed Premier to offer very competitive products and pricing in the marketplace. A colour brochure is available on request.



**ENGINEERING SUPPORT** - Facilities include computerised test equipment for cells and battery packs, electronic loads capable of duplicating most applications in the field. Our experienced and qualified technicians offer knowledge and expertise gathered over many years experience in this specialised field. Premier offer a comprehensive service to the industry in design, testing and engineering support.



**VIDEO** - The range of portable video batteries for professional camcorder users is complemented with a refurbishment service for belts and lighting batteries. Capacity matching of cells for this heavy duty application is provided to ensure maximum reliability.



**CHARGERS** - The System 90 range of chargers offer the capability to charge, analyse and condition nickel cadmium and nickel metal hydride batteries increasing life and reliability of the battery. The simple plug-in adaptors are easily interchanged and are suitable for two-way radio, cellular phone, notebook batteries. System 90 is a valuable tool in all areas where batteries are in constant use.



**PACKS AND ASSEMBLIES** - Premier manufacture a range of packs and assemblies to suit customised applications and have facilities to offer a refurbishment or reconditioning service for battery packs which are hard to obtain, or no longer available. Increased capacity and performance can both be obtained using the latest high performance cells from the leading manufacturers.



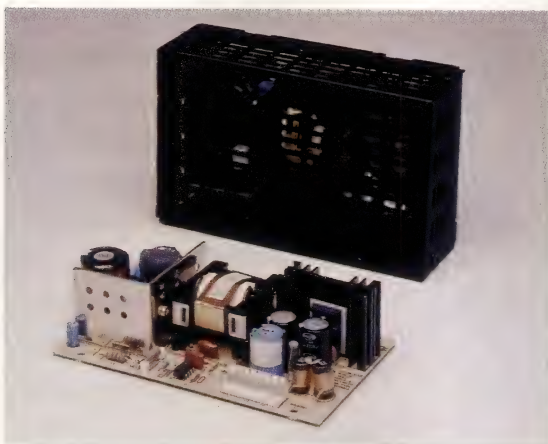
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## 40-110W dc-dc converters



Powerbox Australia has available the PD series of low cost, compact and lightweight dc-dc converters. This medium power range of single and multi-output converters comes in three basic output power ratings - 40, 65 and 110W. Outputs are 5, 12, 15 and 24V for single output models. The dual, triple and quad output units all have +5V as the main output, with +12, +15, +24, -12, -15 and -5V in various combinations.

Input range is very wide at 3:1 and there are three different levels - 10-30V, 20-60V and 30-90V. Three mechanical configurations are available - open PCB, L bracket and enclosed.

Further enquiries to: (02) 9457 2200.

## Battery-charger controllers

Analog Devices has released the ADP3810 and ADP3811 precision battery-charger controllers, which combine user-programmable current limiting and precise voltage control to charge lithium ion, nickel-cadmium and nickel metal hydride batteries. They combine a precision 2V reference, control input buffer, under-voltage lockout comparator, output buffer, and over-voltage comparator in an 8-pin SOIC for -40 to +85 degreesC.

Charging currents are programmable from typically 100mA to 1.1A. The 3810 features on-board precision resistors for  $\pm 1$  per cent overall accuracy when charging Li-ion batteries.

Further enquiries to: (03) 9761 3455.

## Voltage supervisory IC

Avnet Pacific has released a Power-On-Reset (POR) voltage monitor from National Semiconductor with guaranteed accuracy of 1% over the temperature range -20°C to 85°C and with guaranteed reset valid down to  $V_{cc} = 0.5V$ . The LP3470 is designed

to prevent fault conditions that typically occur during power-up, power-down and brownout conditions. Typical applications include intelligent instruments, computers and portable battery-powered equipment.

The LP3470 is available in six standard reset threshold voltages (2.63, 2.93, 3.08, 4.0, 4.38 and 4.63V). It is housed in an SOT23-5 package and designed to generate a reset output whenever the supply voltage falls below preset specifications. It can be programmed to more than 50 different reset threshold voltages between 2.4V and 5V in 50mV increments.

Other features include immunity to short voltage transients and a low quiescent current of 16 $\mu A$ . This is useful for monitoring battery powered systems, particularly lithium ion batteries.

Further enquiries to: (02) 9878 1299

## Valve regulated batteries

Panasonic will be introducing its MSE valve regulated lead acid batteries next year. They are designed for use as backup power in telecommunications, emergency lighting, uninterruptible power supply, engine starting and switching operation applications.

Under normal usage conditions, the gas produced during charging is chemically absorbed by the negative plates. This prevents venting from the battery via the valves, ensuring that there is no need to top up the battery during its service life.

They can be installed in either the upright position or on their side. Versions are available from 50 to 3000Ah.

Further enquiries to: (02) 9986 7628.

## Switchmode current sources

VelteK announces from Maxim Integrated Products the new MAX1640/MAX1641 high-efficiency switchmode current sources. These devices provide up to 2A of regulated current with a microcontroller in battery charging applications. The user sets the fast-charge, top-off, and trickle-charge currents, the maximum voltage and the switching frequency using external resistors.

The devices accept dc input voltages from 5.5 to 26V. The output voltage range extends from 2V to the input voltage. The devices use a pulse width modulated scheme to control an external P-channel power switch and an optional external N-channel MOSFET synchronous rectifier, for increased efficiency.

Further enquiries to: (03) 9574 9300.

## Two and four way IEC outlets

Bulgin, represented in Australia by Braemac, has added three new products to its EN60 320-2-2 IEC power outlet range, specifically designed for use with uninterruptible power supplies and work-

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## PRODUCT SURVEY

station equipment. The PX0714/2 and PX0714/4 are one-piece moulded snap-to-panel modules, providing two, three or four way power outlet options. They are pre-wired with solid bus bars to reduce equipment protection costs. For safety-critical applications, variations with moulded rear protection covers are available.

Rated at 15A, 250Vac UL/CSA and 10A, 250Vac VDE/SEV/SEMKO, variations are available to fit panel sizes 1, 1.5, 1.8, 2 and 2.5mm, with 2.8mm solder tag terminations. These space-saving components are suitable for applications where multiple outlets need to be supplied from one power source.

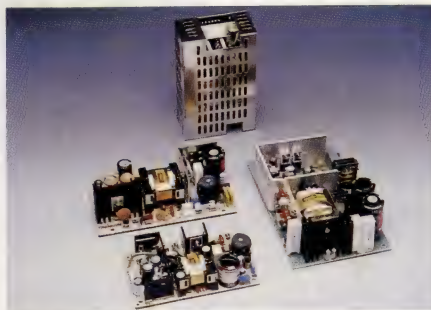
Further enquiries to: (02) 9550 6600.

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Further enquiries to: (03) 9761 3455.

### Switchmode power supplies



Powerbox Australia has available PU series universal input 30-200W switchmode power supplies. The series consists of single, dual, triple and quad output units with power units of 30, 40, 65 and 100W, all based on a low component flyback converter, constructed on a single open frame PCB. All of these operate from any input voltage from 84-264Vac. The higher power unit in the series is 200W, constructed as a single circuit board mounted in a metal U channel, which provides mechanical support and heat sinking. This unit has autoranging on the input 90-130V and 180-260Vac, and uses a single ended forward converter with magnetic amplifier and linear stabilised secondaries.

Further enquiries to: (02) 9457 2200.

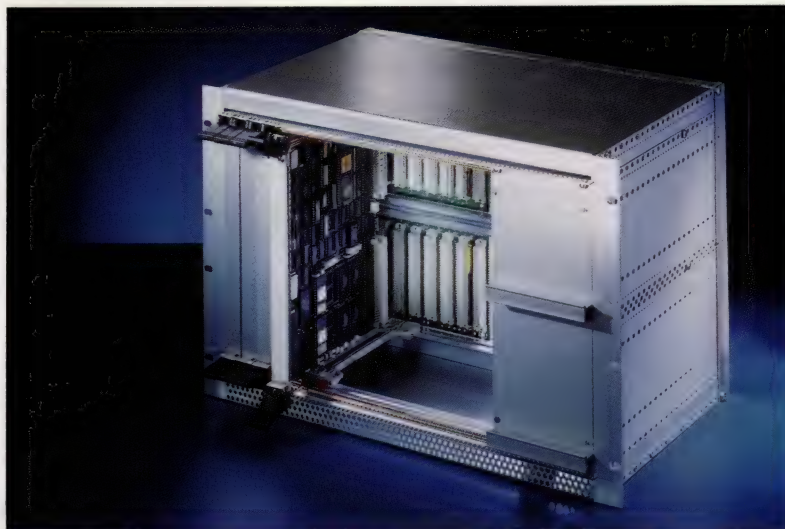
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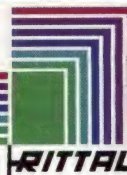
New Rittal RIPAC Microcomputer Packaging Systems are now available in Australia.

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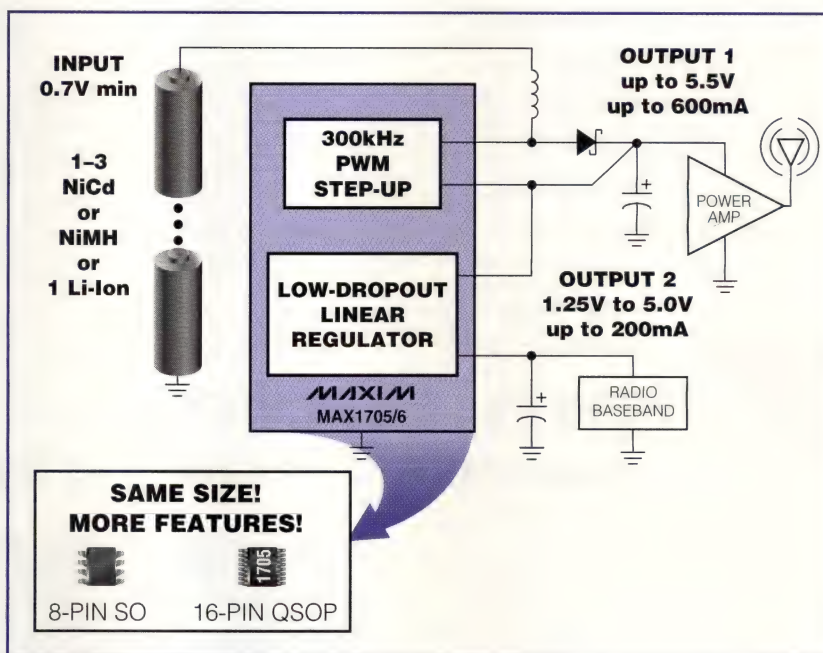


# DUAL-OUTPUT PHONE DC-DC SUPPLIES POWER AMP & LOW-NOISE CIRCUITS

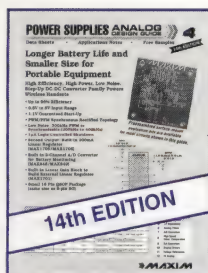
## 95% Efficient, Low-Noise Step-Up Delivers 800mA from 1-3 Cells

The MAX1705 and MAX1706 combine a high-efficiency, PWM, step-up DC-DC converter with a 200mA linear regulator to generate dual outputs from battery inputs such as one to three NiCd or NiMH cells or one lithium-ion cell. The step-up output drives a phone power amp while the linear regulator provides low-noise power to the rest of the phone. The devices' 300kHz  $\pm 14\%$  fixed-frequency switching minimizes interference. Or, use an external clock to synchronize their switching from 200kHz to 400kHz.

- ◆ 0.7V to 5.5V Input Range
- ◆ 1.1V Guaranteed Start-Up
- ◆ Step-Up Output (2.5V to 5.5V adj.)
- ◆ Linear Regulator Output (1.25V to 5.0V adj.)
- ◆ 1 $\mu$ A Shutdown Current
- ◆ Pushbutton ON/OFF Control
- ◆ MAX1705 EV Kit Speeds Designs



The combination of a high-efficiency, step-up DC-DC converter and a low-dropout linear regulator provides high power for the transmitter power amplifier and a low-noise supply for wireless handset applications.



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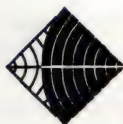
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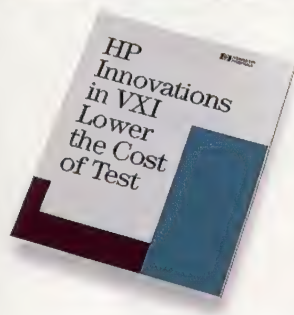
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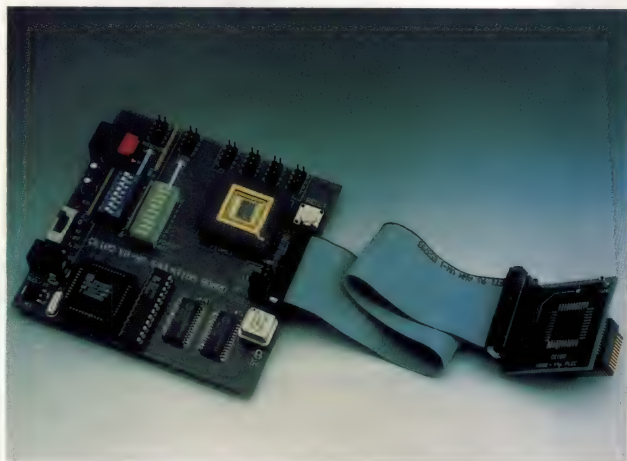
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**EB-XA emulation board**

Alfa-Tek has available a new low-cost EB-XA emulation board, from Ceibo. The powerful emulator is dedicated to all Philips 80C51XA microcontroller derivatives.

The EbxXA links serially to a PC or compatible system and can emulate the microcontroller using either the built-in clock oscillator or any other clock source connected to the microcontroller. The clock oscillator generates 24MHz, 14.7456MHz, 12MHz and 6MHz.

A special Philips bond-out chip is used to emulate the microcontroller, releasing all the microcontroller resources to the user, and the system

emulates the microcontroller in ROMless and ROMed mode.

The MS Windows software includes a Source Level Debugger for C and Assembler, On-line Assembler and Disassembler, Software Trace, Conditional Breakpoints and many other features.

The EB-XA kit includes Assembler and C-Compiler so the user can write the first application based on XA architecture and try it in real time - breakpoints allow real-time execution until an opcode is executed at a specific address or line of the source code.

Further enquiries to: (03) 9720 5344.

**Immersion heaters**

Sephco Industrial heating has introduced the TFM series of PTFE sheath immersion heaters for plating applica-

tions and corrosive liquids. They are resistant to most industrial chemicals, including those based on hydrofluoric, hydrochloric and sulphuric acids.

The heaters are available in many standard shapes and sizes including drop-in type, low-profile and screw-in. They feature a heavy wall PTFE sheath extruded over the length of the stainless steel element casing, a PTFE-protected over-temperature thermal fuse, and a flame retardant vapour-tight polypropylene terminal box with 1m of flexible PVC liquid tight conduit.

Further enquiries to: (02) 9791 0266, email [info@sephco.com.au](mailto:info@sephco.com.au)

**pH Reflex electrodes**

Amalgamated Instrument Co. is offering Reflex pH electrodes, now assembled in Australia. The company advises that due to their unique solid state design, Reflex electrodes offer greatly extended life expectancy, typically 10 to 20 times that of conventional liquid junction types.

The electrodes incorporate a non-porous but conducting hard polymer junction, which immobilises the electrolyte, preventing contamination and clogging. At no time does the

reference solution come in contact with the process solution. The design also allows the electrodes to operate accurately over 0 to 100 degrees celsius and at pressures of up to 7 bar, making pressure housing unnecessary in many applications.

An active surface area of approximately 1000 times greater than conventional electrodes leads to a rapid response to pH changes.

Further enquiries to: (02) 9476 2244.

**Single-chip PCM codecs**

Zatek has announced the availability of new single-chip PCM codecs with voice-band filtering, from Texas Instruments. The TMC37C13A, TMC37C14A and TMC37C15A are based on the proven TI TMC2913A core, and have the added feature of programmable transmit and receive gain.

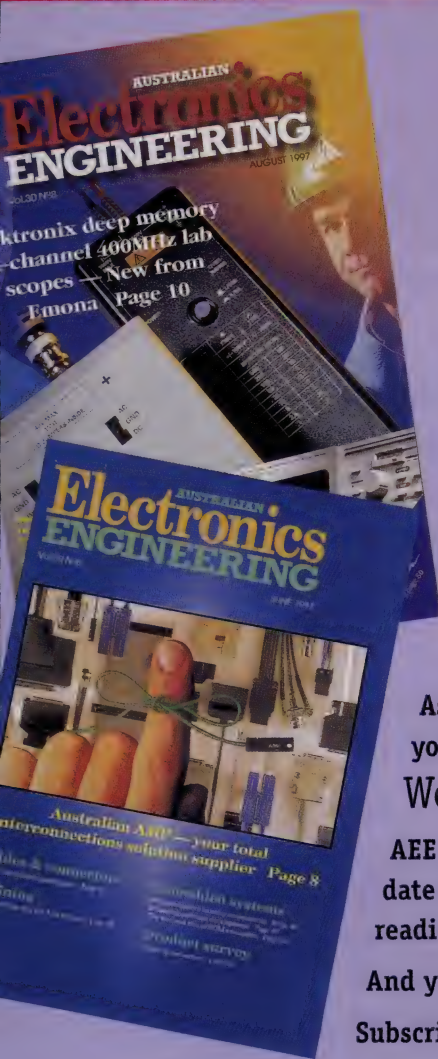
They are designed to perform transmit encoding (A/D conversion) and receive decoding (D/A conversion) as well as transmit and receive filtering functions required to meet CCITT (D3/D4) G.711 and G.714 specifications in a

PCM system. Each device provides all the functions required to interface a full-duplex, 4-line voice telephone circuit with a TDM (time division multiplexed) system, and also perform the encoding and decoding of call progress tones.

The devices are suitable for use in DSP-based solutions for central office line cards, PABXs, and voiceband communications systems. They are intended to be used at the analogue termination of a PCM line or trunk to the POTS local loop line.

Further enquiries to: (02) 9744 5711.





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## Float and drop switches



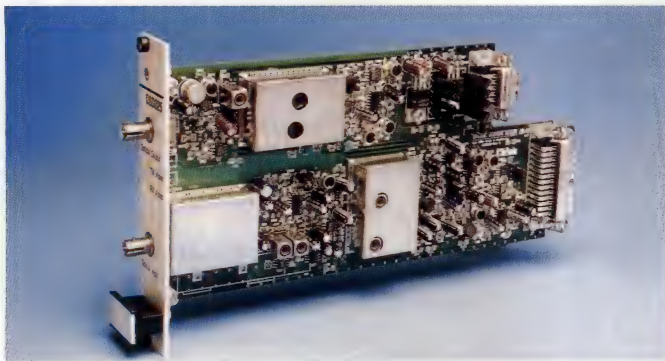
C&K Components Plus is offering Crydom liquid-level float and drop switches using polyphenylene sulphide (PPS) as a body material. Typical applications are in vending machines, industrial process equipment, air conditioning, test and laboratory environments.

The sensors are suitable for switching a wide range of

ac and dc voltages. And the PPS material allows the sensors to be used in hot liquid environments up to 120°C. For lower temperature requirements, they are also available in PVC, GFS nylon, polypropylene, polysulfone and acetal.

Further enquiries to: (03) 9587 4044, email: [ckplus@ca.com.au](mailto:ckplus@ca.com.au)

## Fibre optic modem



Optical Systems Design has released its OSD325 fibre optic modem. It offers full duplex video, high quality program audio, data and 2-wire or 4-wire intercom making it suitable for applications requiring audio, data and video distribution.

Examples of applications include: campus distribution (and sourcing) of lecture material; CCTV systems employing the reverse video for channel for camera synchronisation; deployable video/audio

surveillance/command systems; and video conferencing.

It normally operates over two singlemode or multimode fibres (one for each direction) but can be supplied with a built-in wavelength division multiplexer for single fibre operation. It is available as either a stand-alone ac or dc powered module or as a card which plugs into the OSD370 14 slot 19in rack mounting chassis.

Further enquiries to: (02) 9913 8540.

## Alphanumeric LCD/LED

The Parvus alphanumeric display system is available from Observer Systems. It uses industry standard LCD alphanumeric display modules from one line by 8 characters to four lines by 40 characters. The display is LCD back-light controlled and has simple matrix keypad scanning. The system consists of a PC/104 LCD interface board and an external LCD display/keypad board.

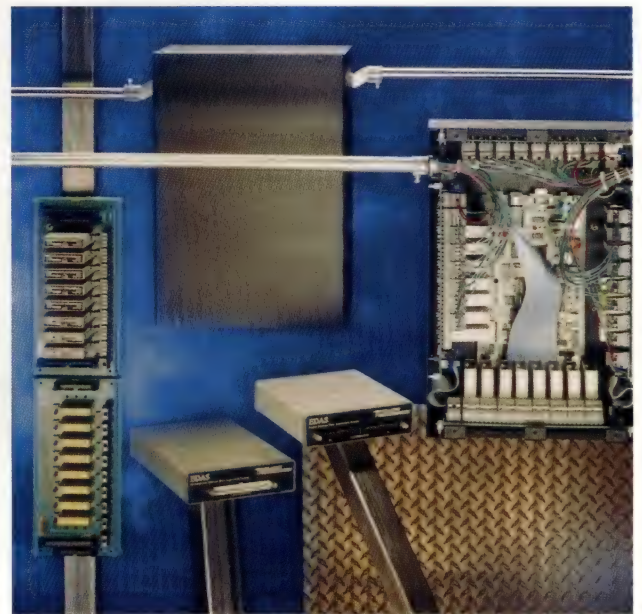
A software driver is provided that allows the display to be automatically mapped to any standard text screen at any memory location. The driver also scans the keyboard

and stuffs characters into the DOS keyboard buffer as keys are pressed.

The interface board contains an industry standard 16-pin LCD connection and a 20-pin 8x8 keyboard connection. A special combined connector is also provided to attach to a pre-configured external display/keypad board. An LCD display/keypad is available with a backlit four line by 16 character display and a single 8-position keypad. An LED display/keypad is available in the same format.

Further enquiries to: (02) 9888 9143

## Ethernet data acquisition systems



Kenelec is offering Intelligent Instrumentation's new "ruggedised" versions of their EDAS Ethernet data acquisition systems, which provide easy and convenient mounting as well as protection from industrial environments. All components, including isolation and signal conditioning, are housed together in a strong steel enclosure.

The systems use standard 5B series analogue signal conditioning modules and Opto-style optical isolation modules. Quick-disconnect screw terminal blocks accommodate field wiring.

The systems are available

in either digital I/O or multifunction models. The digital I/O EDAS provides 32 channels of TTL digital I/O, programmable as inputs or outputs in four 8-bit ports. The multifunction EDAS provides 16 single-ended/ 8 differential analogue inputs at 12-bit resolution, two 12-bit analogue outputs, and 16 digital I/O channels. Analogue input channels can be configured on a channel-by-channel basis for gain and sequencing. All digital inputs can be configured for state detection, counting, or latching.

Further enquiries to: (03) 9878 2700.



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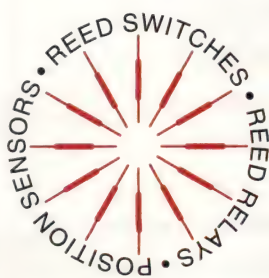
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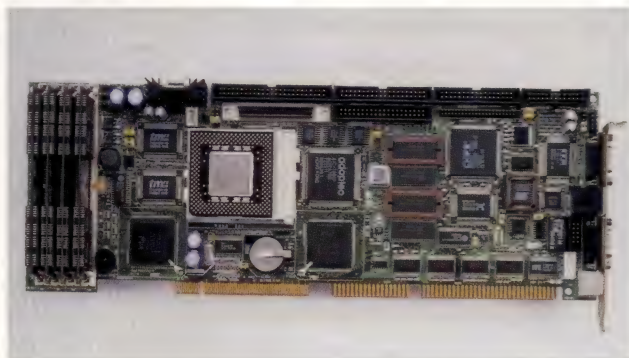
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## NEW PRODUCTS

### Pentium MMX CPU card



Priority Electronics has available the Advantech PCA-6159 series of industrial full-size CPU cards which allow the use of VGA CRT/LCD, LAN, SCSI and other enhanced I/O interfaces.

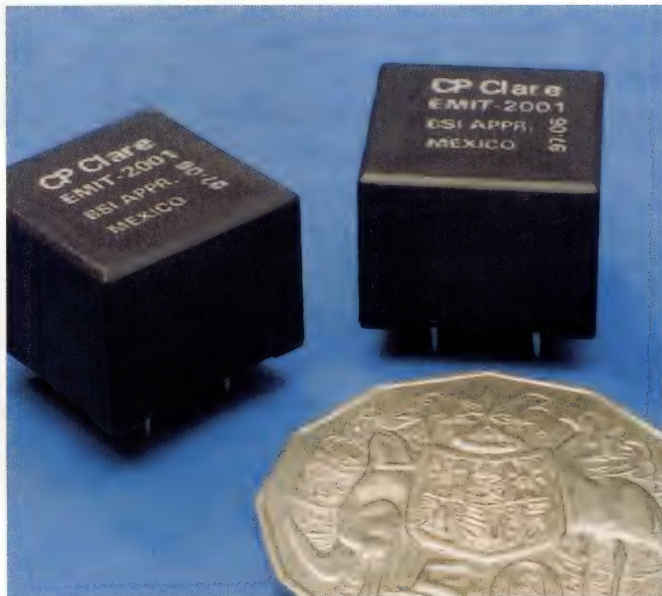
Five variations are available to meet the differing needs of industrial computer system integrators. The PCA-6159L is a basic function MMX CPU card. The PCA-6159V provides on-board VGA which supports both CRT and LCD. The PCA-

6159F and PCA-6159H both include on-board VGA, Ultra-wide SCSI interface, and LAN controller, while the PCA-6159H has a high-current ISA interface that can supply power to other peripheral computing devices.

The series is suitable for computer telephony integration, network servers, critical application computers, and industrial monitoring and control.

Further enquiries to: (03) 9521 0266.

### Austel approval for transformers



IRH Components has received Austel CCL approval No. A97/LTD/0021 for the type EMIT-2001 and EMIT-1200 range of double-insulated, encapsulated line isolating transformers from C.P. Clare Corp. Advanced Magnetic Division.

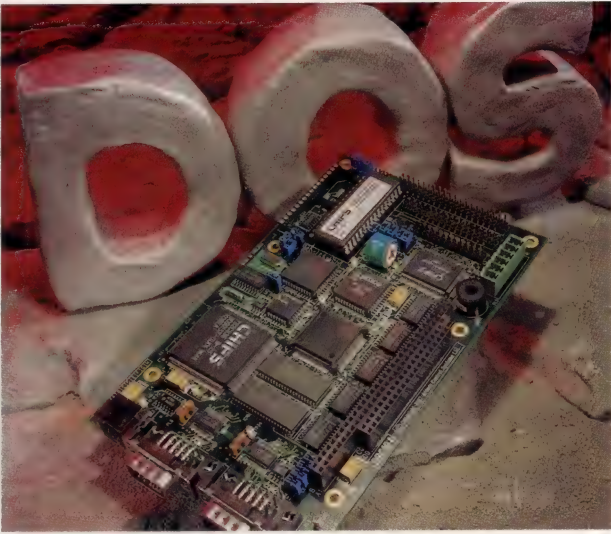
The EMIT range also satisfies the requirements of

EN60065 and EN60950 and features a small, encapsulated low-profile package for PCB mounting. Designed for dry circuit operation, the range features excellent frequency response, low total harmonic distortion and insertion loss.

Further enquiries to: (02) 9364 1766.



## PC/104 single board DOS engine



Backplane Systems has advised that Arcom Control Systems has added further features to its SBC104 single board computer, without altering the price. The low-cost DOS-based embedded PC now has an LPT parallel printer port, on-board RS-485 serial communications and an extra site for additional Flash EPROM.

All SBC104s are available with either 2 or 4Mb of on-board DRAM, 1 or 2Mb of Flash EPROM, plus an optional 128Kb of battery-backed SRAM. They are supplied with fully-licensed ROM DOS 6.22. Loaded into Flash

EPROM and deploying Arcom's Flash Filing system, the system builder can take full advantage of a complete DOS-based CPU product without the need of hard or floppy disk drives.

Suitable for many control applications, the PC's low-cost enables design flexibility for MMIs, networks or machinery equipment. It is offered with either an entry-level 25MHz Intel 80386 CPU or a Texas Instruments 486SXLC2 running at 50MHz, for more demanding applications.

Further enquiries to: (02) 9456 5400.

## CompactPCI systems

Motorola Computer Group has announced the CPX Series of OEM systems based on CompactPCI. A range of base systems, a choice of processor families and a scalable modular architecture allow the OEM to configure high-performance CPX systems to help meet the needs of a wide range of telecommunications and industrial automation applications. The base systems being released are the CPX6108, an 8-slot fault-resilient system and the CPX4004, a 4-slot low-cost panel-mount system. Processor options include both PowerPC, for popular real-time kernel support, and Pentium, for Windows NT.

The 8-slot CPX6108 is designed for applications which

demand a high level of system availability. Drive bays with hot-swap disk carriers allow mirrored redundant disk drives to be used and cooling fans can also be hot swapped. System availability is enhanced by design for rapid maintenance. Front access to CompactPCI boards, disk drives and power supplies makes field replacement quick and easy. An integrated System Monitor and Status Display subsystem monitors all DC voltages, CPU and chassis temperatures, fan operation and watchdog timer, giving visible and audible alarms if they exceed safe operating ranges.

Further enquiries to: (02) 9906 3855.

## SO-8 MOSFET

Adilam has available Fairchild Semiconductor's SuperSOTTM-8 package version of the popular SO-8 MOSFET, offering size and cost savings with improved performance over its SO-8 counterparts. This new device is suitable for power conversion and power management applications in portable and battery-powered equipment such as notebooks, desktop computers and dc-dc converters.

In this new 30V, logic level, N channel MOSFET, (part

number FDR4410), improved technology has reduced the die size, enabling the product to fit into a package with a footprint of just 62% of the SO-8 package. In addition, there is a 30% reduction in package thickness and a significant cost saving (approximately 10%) over SO-8 packages. At the same time, the advanced lead frame design is optimised for power handling capability.

Further enquiries to: (03) 9761 4466.

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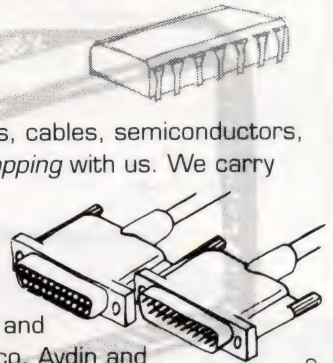


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## NEW PRODUCTS

### Green light for checkweigher



Salter Weigh-Tronix has introduced the 3275 Checkweigher which features a "traffic light" display, allowing the operator to precisely monitor por-

tion control, and fine tune machinery output.

The colour display indicates product weight in one of three categories - green means acceptance, red means too light, and yellow means profits are shrinking. The degree of error is indicated by the level of red or yellow displayed.

The system features a transaction counter that automatically updates with

each weighing operation, giving daily, weekly or monthly data.

Further enquiries to: (03) 9894 2444.

### Telephone line emulator

Dice Technologies has announced the release of the telephone line emulator (TLE), designed for product development and product test applications. It consists of a base hardware platform with a software module providing advanced testing capabilities, including programmable impairments, attenuation, impedance and Type 2/3 Caller ID.

Users can create their own program configuration via a Windows interface. Real world line conditions such as echo,

white noise and satellite delay can be emulated. Additional features include audio messaging, WAV files, multiple message playback, audio port and status display window for user feedback. It can be set up to operate as a four-port device or as a dual two-port unit.

Software modules are available for more advanced test operations.

Further enquiries to: (03) 9761 0101, email [dice@mag.nafield.com.au](mailto:dice@mag.nafield.com.au)

### Power transistors

Veltek Australia has released the MAX2601/MAX2602 low voltage bipolar power transistors.

High gain and high efficiency make them suitable for the final stage of a discrete or module class-C or class-AB RF power amplifier

They exhibit 11.5dB gain

while producing 1W of RF power at 900MHz from a 3.6V supply voltage. The collector efficiency is 58% and the 2nd and 3rd harmonic suppression is 43dBc. The devices withstand load mismatch conditions.

Further enquiries to: (03) 9574 9300.



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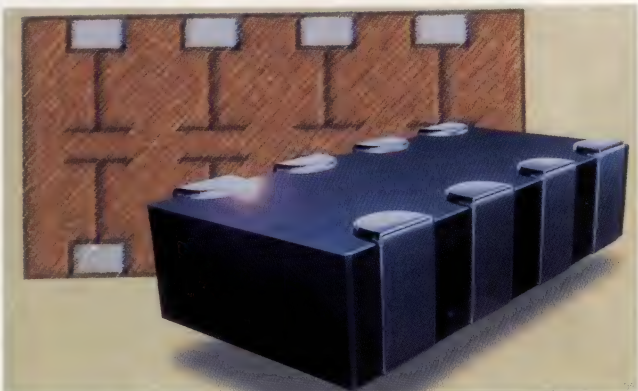
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## NEW PRODUCTS

### Ceramic capacitor arrays



Philips Components has introduced a new range of ceramic multilayer capacitor arrays, designed to save equipment manufacturers material and production costs.

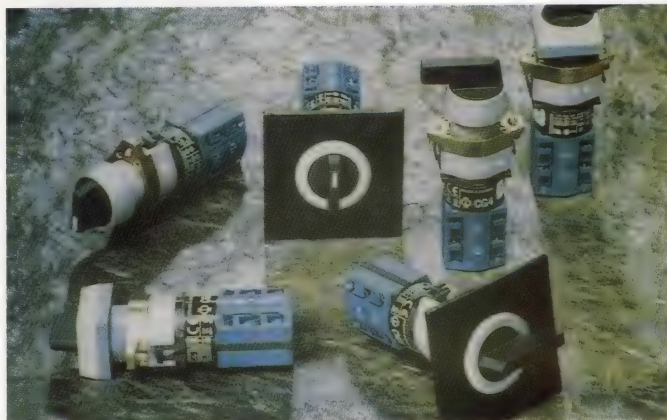
The C-Arrays contain four CMCs in a case size of only 1206 (4 x 0603). Manufactured in the company's CMC technology, they offer high capacities per unit volume and high performance and reliability. Combining these

qualities with the easy handling and placement offered by the 1206 size, they are expected to provide important benefits in cost-sensitive applications, especially where high packing density is an important requirement.

The arrays are suitable for application in data processing, consumer electronics and telecommunications.

Further enquiries to: (02) 9805 4479.

### Rotary switches



IRH Components has released the EAO series of CG4 rotary switches. With select categories, the CG4 is suitable for a wide range of switching applications, including resistive or low inductive loads, control devices, contactors, electromagnets, motor starting and other high-inductive loads.

Switch element contact points are silver alloy with gold plating, and the high con-

tact pressure and low contact resistance guarantee high switch reliability. Up to 12 switch positions, together with a maximum 16 N.O. contacts, are available.

The switch position function is reliable and non-ambiguous. Actuators are available with round and square front designs.

Further enquiries to: (02) 9364 1766.

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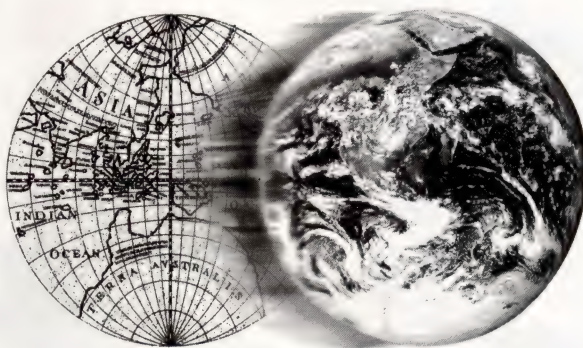
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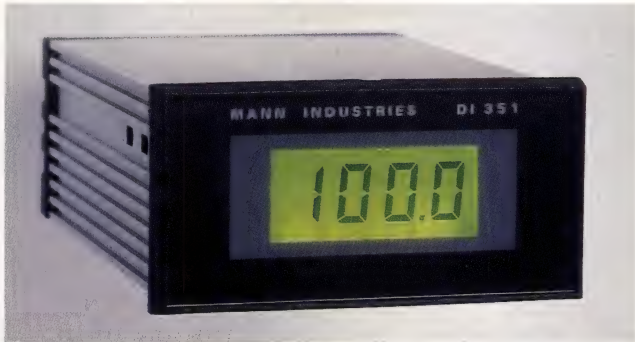
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## NEW PRODUCTS

### 3.5 digit LCD indicator



Mann Industries has added to its range of indicators and totalisers with the DI 351 digital indicator, suitable for use in applications where there is high ambient lighting. It has a three and a half digit liquid crystal display and is compact and cost-effective, designed specifically for fixed-input format applications. Standard input ranges are 4-20mA and 0-10V, but other current and voltage ranges are available on

request.

The indicator comes with a 24Vdc supply, suitable for powering a two-wire transmitter as an input, while maintaining single loop integrity. Zero and span 22-turn potentiometers at the back of the indicator allow the user to adjust the display range on site. Field wiring is brought into the instrument via a male/female screw type terminal block. Further enquiries to: (02) 9477 5822.

### 13-slot VXI mainframe

National Instruments has announced the availability of the VXI-1500, a C-size 13-slot mainframe with a high output power supply.

It complies with the VXIbus specification revision 1.4, the VXIplug&play systems alliance specification, and VPP-8, the standard for VXI module/mainframe to receiver interconnection.

It can supply up to 1420W with 220Vac or 1100W with 110Vac, delivering more than 80A at 5V. Over-current protection is managed by a push-

reset circuit breaker. The power supply meets FCC Class B requirements for radiated emissions and is certified as compliant with European Community (CE) and Underwriter's Laboratory (UL) standards. With a 12-layer stripline construction and the use of differential tracking and line length equalisation techniques, the VXI-1500 backplane minimises random noise and signal skew for consistent operation.

Further enquiries to: (03) 9879 5166.

### Dual 6-bit A/D converter

Maxim Integrated Products has announced the MAX1003 dual 6-bit A/D converter, available from Vellek. It combines high-speed, low-power operation with an internal reference clock oscillator and user-selectable full-scale operation. It can also convert two ana-

logue input signal streams to two 6-bit offset-binary-coded parallel outputs, at sampling rates as high as 90Mps. Integral and differential non-linearity (INL and DNL) are less than  $\pm 1/2$  LSB.

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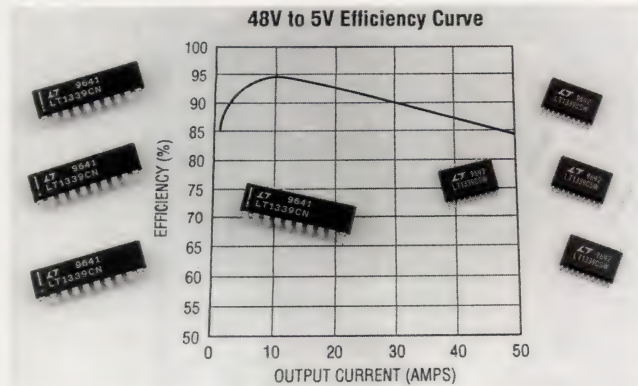
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## Synchronous switching regulator controller



ACD has available the LT1339, a high power, current mode synchronous switching regulator controller that simplifies the design of high current, high voltage dc-dc voltage converters. It incorporates robust synchronous N-channel drivers that handle input voltages up to 60V.

The device is capable of driving MOSFET gate capacitance up to 10,000pF to effi-

ciently deliver load currents in excess of 50A. The drivers include an adaptive non-overlapping gate drive to prevent shoot-through and gate drive undervoltage lockout. These features prevent the external power MOSFETs from turning on simultaneously, thereby increasing efficiency and reducing strain on the input supply.

Further enquiries to: (03) 9762 7644.

## Smartcard microcontroller

Braemac is offering SGS-Thomson's ST16RF42 serial-access microcontroller for use in high-volume contactless and contact-based smartcard applications. The device has 16Kb of system ROM, 384bytes of RAM and 2048bytes of EEPROM. The user ROM and the EEPROM can be configured into two sectors, with a user-defined memory access control matrix governing memory accesses between different sectors.

The device's specifications include 3V operating voltage, 13.56MHz operation, 106Kb/s

data transfer, and direct connection to the external antenna. Amplitude modulation (10% modulation index) is used for transfers from the reader to the card, and load modulation for transfers from the card to the reader. In contact mode the device supports internal clock frequencies of up to 5MHz, and operates over an extended supply range of 2.7V to 5.5V. It complies with ISO7816 standards for contact assignment and serial access.

Further enquiries to: (02) 9550 6600.

## Distributed hyperchannel switch

Mitel Semiconductor has introduced the MT90840 distributed hyperchannel switch, available from INSIGHT. The device enables serial-to-parallel bus and parallel-to-serial bus switching configurations. The switching core of the device supports 512 possible channels on the

serial bus and up to 2430 channels on the parallel bus. Serial data rates of 2.048Mb/s, and 8.192Mb/s are programmable while the parallel bus can be set to 19.44Mb/s, 16.284Mb/s and 6.480Mb/s.

Further enquiries to: (03) 9761 3455.

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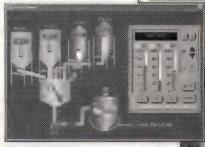


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## Snap-in capacitors



to 450V and in several case sizes. A rated operating voltage up to 450V means that they are suitable for mains filtering in pre-conditioned circuits using up-converters for power factor correction. In these circuits, voltages exceeding 400V are common.

Based on a new electrolyte, the capacitors exhibit good

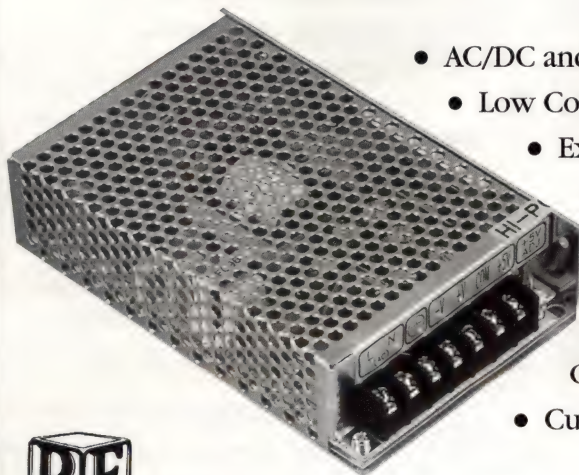
Philips Components is introducing the PUL-SI 159 miniature "snap-in" series of electrolytic capacitors.

They are designed for a range of filtering and smoothing applications.

The capacitors are available in E12 values from 56 to 1800µF, in voltages from 200

thermal behaviour, low ESR, low dissipation factor and high ripple current capability per unit volume. This leads to improved filtering characteristics. They are also suited to applications in which miniaturisation is important.

Further enquiries to: (02) 9925 3281

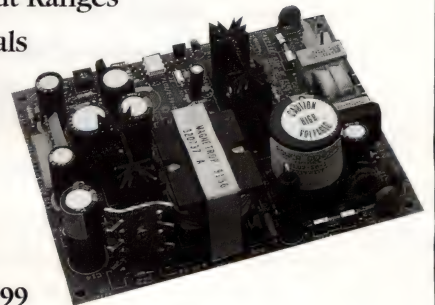


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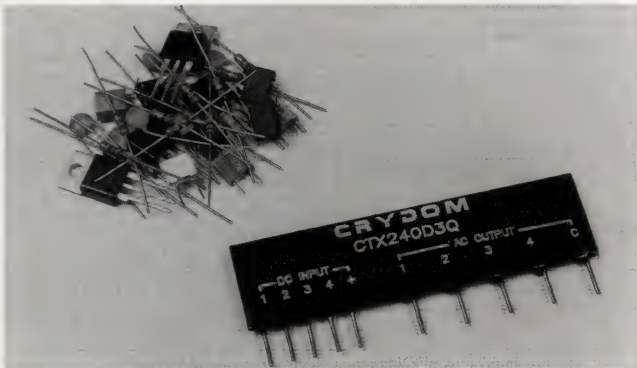
**Sydney**  
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## NEW PRODUCTS

### Solid state relays



C&K Components Plus is offering a range of Crydom solid state relays for PCB mounting in either SIP or DIP packages. Line voltages are available in ac and dc and from 1A to 25A.

The epoxy coated relays are particularly suited to high density printed circuit boards. The CTX series offers four independently controlled ac relays in a PCB package. It features Triac output, high

surge rating, low leakage and a 4-10V logic compatible input.

The AO/ASO series are 1-2A miniature solid state relays with dimensions of 24x13x5mm. They are dc controlled with either Triac output (AO) or SCR (ASO). The ASO models are designed for switching high-inductive low-current loads.

Further enquiries to: (03) 9587 4044, email [ckpl@ca.com.au](mailto:ckpl@ca.com.au)

### Opto-isolated feedback amps

Zatek has announced the Texas Instruments

TPS5908/08A/10/10A opto-isolated feedback amplifiers which consist of the industry-standard TLV431 precision programmable reference with a 1% reference voltage tolerance and an optocoupler in a single package.

The TPS5908/10 parts have a controlled optocoupler current transfer ratio (CTR) of 100% to 400%, whereas the "A" suffix parts have a CTR of 150% to 300%. The

TPS5910/10A are identical to the TPS5908/08A with the added feature of having the base of the phototransistor brought out to an external pin.

Zatek says there is presently no direct single-chip competition for these devices, and that compared to discrete solutions, these devices offer designers a solution in a single 8-pin DIP or 8-pin gull wing package, thus saving board space and inventory.

Further enquiries to: (02) 9744 5711.

### High current connector system

Utilux is offering the new Molex Mini Fit HCS High Current Connector system. The 4.2mm centre power connector can carry up to 12 amperes per circuit, depending on housing configuration.

The Mini Fit HCS terminal carries three more amperes per circuit than the standard

Mini Fit Jr terminals, while, in similar applications, fitting in the same housing configurations as the Mini Fit Jr, Mini Fit BMI and Mini Fit TPA connector systems. Using standard Mini Fit housing configurations reduces requalification and design time. Further enquiries to: (02) 9150 0155.

## RF SHIELDING GASKETS

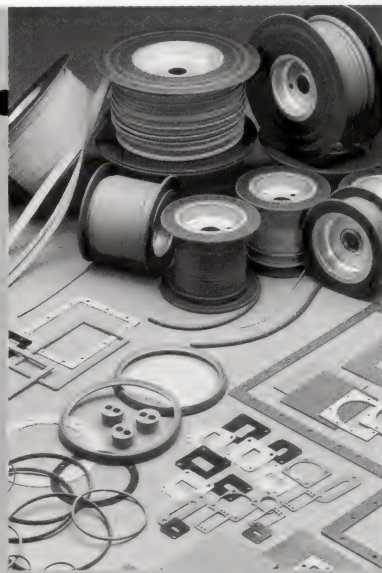
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## NEW PRODUCTS

### LED lamps



Hewlett-Packard has announced a line of 5mm (T-1 3/4) aluminium-indium-gallium-phosphide (AlInGaP) light emitting diodes. They are suitable for use in traffic management designs, such as traffic signals and vari-

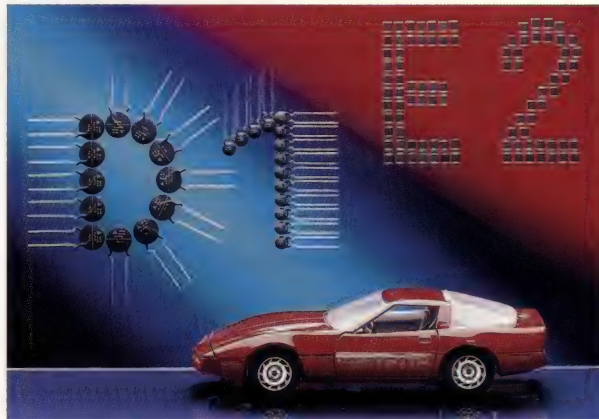
able-message signs, and in commercial outdoor advertising.

The LEDs feature a special lens structure that allows precise control of light output. They use advanced optical-grade epoxy for brightness stability and reliability under a range of conditions. The epoxy also contains UVA and UVB inhibitors to reduce the effects of long-term exposure to direct sunlight.

They are available in three viewing angles and three colours: amber (592nm), reddish-orange (617nm) and red (630nm). Each version is available with standoff tabs on the lead-frames to make automated assembly easier.

Further enquiries to: (03) 9272 2001

### Overvoltage safeguards



Siemens has released two series of varistors for protecting sensitive electronic circuits in cars from voltage surges.

The SIOV-S.AUTOD1 radially leaded disk varistors have full dc and load-dump capability and can survive a thousand temperature shocks between -40 and 125°C. Applications include motor controllers or high-voltage gas-discharge lamps.

The E2 varistor CN2220S 14BAUTOE2G2 is the result of follow-on development of ceramic material and refinement of the manufacturing process.

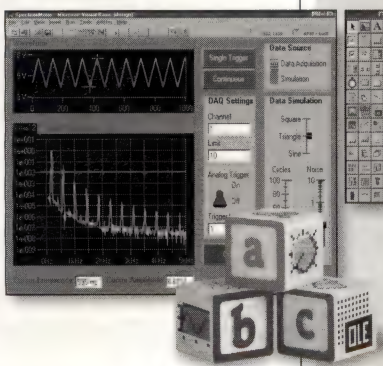
The SMD varistor has 25J load-dump energy absorption capability and can withstand a maximum current surge of 1200A.

Further enquiries to: (03) 9420 7716.

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# EDA: Battling the big boys

One of Australia's top exporters also defines the state of the art in EDA software.

**E**lectronic Design Automation is just 25 years old, even if one insists on the most charitable definition of automation. Yet it's an industry that has now reached a level of maturity, at affordable prices, that would have seemed miraculous just a few short years ago. It's an area dominated by seven or eight US companies, and one Australian.

The state of the art in modern EDA is that a designer, working on a desktop computer, can wire together a circuit schematic, stimulate it as it will be stimulated in the real world, and examine all the outputs. When the circuit works the way it should, the schematic can be converted into circuit board artwork, and instructions prepared for numerically controlled machines that will drill the holes and place the components.

This technology is the fundamental technology that drives the rest of the industry, because of its power to increase the productivity of engineers battling time-to-market issues. But it hasn't happened overnight. For the players in the industry, it has been a long struggle to exact the most from recalcitrant hardware.

It has also been a battle of imagination. Potential customers scan each iteration of software for new and better features. A mistake can play havoc with cash flow and it can take years to recover.

Consider the tale of Protel, a tiny Tasmanian start-up. It started life as nothing more than a good idea, in 1983. At that time, a certain amount of automation existed, in the form of automatic



Nick Martin is Protel's chief executive

routers and some primitive simulation systems, but all running on very expensive mini-computer hardware. Indeed, for some of the bigger projects, routing software commanded the resources of mainframes.

Thus it was cheeky, to say the least, to suppose that it would be possible to design a productivity tool on a personal computer, even if one considered a state-of-the-art machine powered by a new Intel 80286 chip. There was precedent, of course. Autodesk in the US was making its first grab for a slice of the mechanical and architectural computer aided design market using desktop PCs. There was reason to suppose that it would be possible in the electronics area too.

In the event, the first CAD products in the electronics industry merely sub-

stituted a computer screen for an artist's drawing board. But within a few years, the first practical automatic routers were appearing on the desktop, and then the vendors began playing leapfrog as first one, then the other, introduced new products and new features.

Protel spent the late 1980s hunting as part of the pack, but its break came when the company decided to make a leap of faith in Microsoft's Windows environment. For a while, Protel was the only significant company offering a serious EDA product under Windows, and the result was a rapid surge in popularity — especially in the US — one that put it into serious contention for market leadership.

Its main rival was the Oregon-based Orcad. Orcad was slow to adopt the new system and paid a price through the early 1990s,

although it is now starting to come back strongly. It has two advantages: as a public company it has access to significant R and D funds, and it recently merged with Pspice, the *de facto* standard simulation product.

This is not to say that Protel is no longer a contender. It has a wide-ranging suite of highly regarded products that together form a complete automation system for an electrical engineer. These are all built on a productive core technology that seems to have plenty of room for development, at least in the short term. The company is still shipping new products - most recently its Advanced Sim product in October 1997. Nevertheless, the lack of R and D funds is a significant constraint on what people would like to be able to do.



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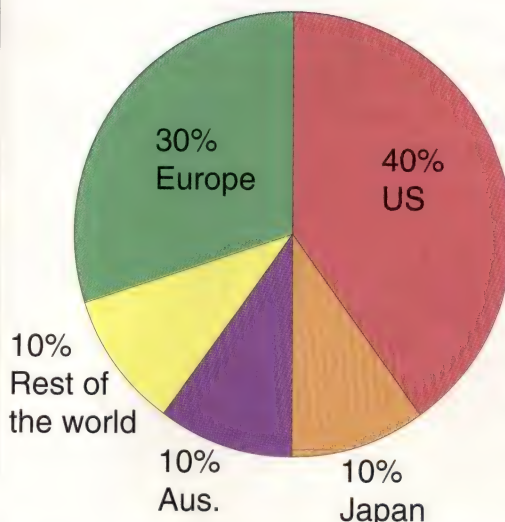
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PROTEL



*Protel's formula for success is the generation of export income. The pie chart shows sales by territory.*

R and D is currently directed at the conversion of Protel's core technology to the 32-bit Windows environments, with the first deliveries before the end of 1997. In the longer terms, the company is also moving towards enterprise-wide solutions. This means growing the product in two directions.

One is towards group engineering solutions, which will permit more than one person to work on a project simultaneously. The other is towards interfacing the electronic design system with the office automation environment — with ordering and inventory systems, financial systems and so on.

Protel also has the strength of a large sales force — 15 in the US alone.

Today, the company has moved far beyond its Hobart-based origins, but it still retains an office there, where eight people are working on library and data development. It maintains a sales office in the US and is in the process of opening one in Japan. Head office is now in Sydney where 35 people are employed, 15 in R and D alone.

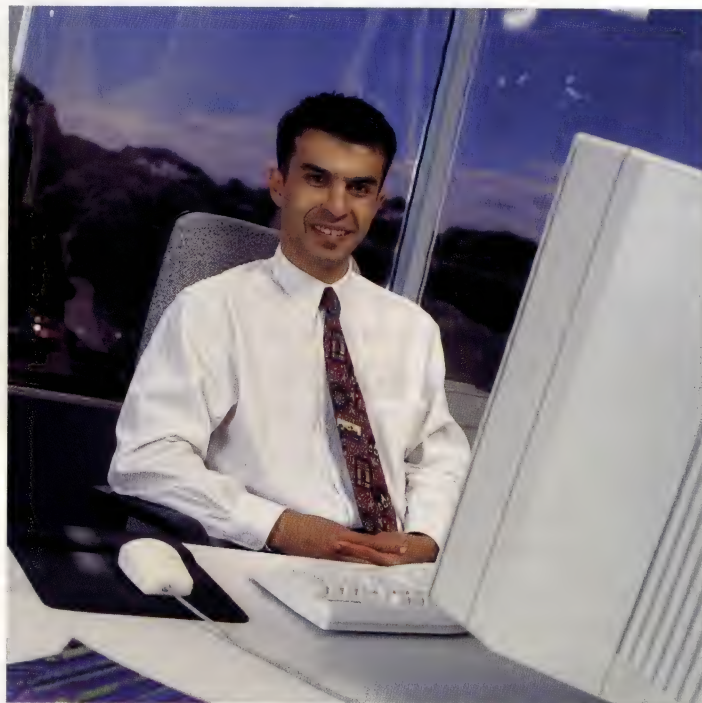
It earns around 40% of its revenue in

the US, and a further 30% in Europe. 10-15% comes from Japan and about 10% from Australia. The rest of the world accounts for the remainder.

It's a position that puts the company in the Top 15 of Australian-owned electronics exporters. It has a turnover of about \$10 million, which gives it around 10 per cent of the market world-wide. The aim today is \$20-\$30 million

It is not an unrealistic target. Currently, the world EDA market is divided into desktop systems like Protel, which come shrink-wrapped and run on standard PCs. The world market for this technology currently amounts to around \$100 million.

But there is a market, dominated by the likes of Mentor Systems, which is an order of magnitude bigger. This market is made up of the big engineering compa-



*Aram Mirkazemi, the director of Research and Development at Protel International.*

nies, in such industries as automotive and aerospace design. In this market, single installations can consist of thousands of seats, and involve millions of dollars.

The gap between the capabilities of desktop EDA and the big systems is shrinking rapidly. In principal, most of the functions of the big systems can already be obtained on the smaller ones. The limitation is essentially one of scale, which is, more often than not, simply a question of hardware performance. And of course, that gap narrows every day. □



# Going global and staying alive

by Justine Geake

Globalisation, industry policy, telecomms deregulation, EMC requirements, Asian currency disaster — it's been a busy year for our industry, as traditional ways of doing business changed before our eyes. Difficult it might have been, but things are on the up.

**W**hat forces have manhandled the electronics industry this year? The issue that most confronted us at every turn was the necessity of globalisation. Every government report on the industry, the advancing juggernaut of the Internet, and visiting Europeans are all telling us to go global or suffer the consequences. The erosion of our traditional reliance on trade barriers to protect our industries is continuing as advanced telecommunications and its offspring, the Internet, are forcing businesses around the world to step onto the international stage. Dr Ockert Van Zyl, Siemens' executive director said in November that the electronics industry in Australia faces a stark choice - become a serious player in the global market and exploit the opportunities offered by the on-line economy, or be reduced to an observer on the sidelines.

The introduction of the EMC framework and the deregulation of the telecommunications industry were the two biggest manifestations of this trend this year, aiming to help knock our businesses into internationally-competitive shape. The government's "sink or swim" attitude was further manifested by abolishing the computer bounty and the R&D tax concession. However it may redeem itself somewhat if it acts on the recommendations of the reports on industry policy currently under consideration.

All up, some parts of the industry look set for significant growth. Already information technology services are experiencing a boom - the *Australian Financial Review* reported recently that this sector is set to reach \$4 billion in revenues in Australia this year, fired by the strong demand for outsourcing and other services. Other sectors, however, are taking a few broadsides. Some distributors for example, are doing it hard from competition from the Internet.

## Industry policy - get global, get overseas investment

The main vehicles of government's proposed revamp of its industry policy were the Mortimer Review of Business Programs for all of Australian industry, and the Goldsworthy report into the information industries.

The Mortimer report, released in July, stated that Australia must pay urgent attention to its export facilitation programs in order to arrest a potential trade deficit in the information industries of between \$30 and \$46 billion by 2005. Its key recommendation was the establishment of an Invest in Australia Bureau with funding of \$1 billion over five years. However, as we went to press, Cabinet had just rejected this recommendation. John Howard is wavering between his economic ministers who reject the Mortimer report, and business associations who are criticising him for not implementing the key recommendations its.

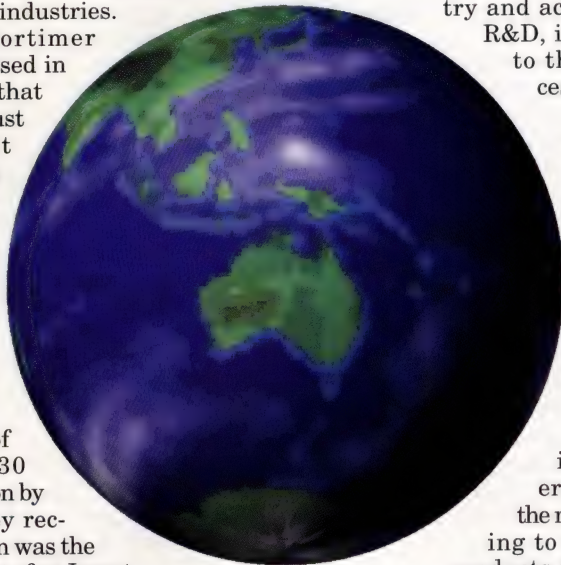
The government's indecision would be amusing if it wasn't so serious. The most pressing thrust of the Goldsworthy report of the information industries taskforce, released in August, was the urgency with which the government must act to ensure Australia has a global place in the information market. The report claimed Australia was uncoordinated in

its policies, was not globally focused and was simply not choosing to compete. Key recommendations were that the government appoint a cabinet level minister for the industry and formulate a national information industries policy, that it restructure the tax system to encourage businesses in the industry and actively encourage R&D, including changes to the R&D tax concession.

The report also called for the removal of unnecessary taxes/tariffs on manufacturing inputs to the electronics industry. As a number of componentry products have a variety of end uses, AEEMA is lobbying the government to remove the nominal tariff applying to all componentry products for which a tariff concession has been granted.

The elimination of the computer bounty by the government in July came at a time when margins are already reduced due to intense competition in the marketplace. The removal of the 150% R&D tax concession has also caused bitter feelings in the industry. A group of major industry associations has written to the Prime Minister asking for the concession's reinstatement.

A further message is clear from several government studies. Australia must increase its investment attraction to become globally competitive in the supply of IT&T products. AEEMA commented that Australia is well positioned to take advantage of many global opportunities





mentioned in the studies, such as small scale manufacturing of niche products with high value added software and the development of significant manufacturing facilities such as a semiconductor plant. Alex Gosman, AEEMA's executive director, commented that to take advantage of these opportunities we need to take measures to foster our indigenous industry to its full potential, and attract globally-scaled multinational investment here.

AEEMA expects the government to make an announcement on industry policy in early December, which will take into consideration both the Goldsworthy and Mortimer reports.

## EMC Framework - no bonanza for test houses

From 1 July this year all new electrical products were obliged to comply with the generic emission standards of the EMC Framework. The new legislation benefits exporters particularly as it brings Australia into line with all its major trading partners, so that compliance with domestic regulations will mean compliance with regulations in Europe and North America.

Industry awareness of the new requirements is now high, according to Ian McAlister, the manager of Radio Communications Standards at the Australian Communications Authority (a new body responsible for all telecommunications, EMC and electrical safety compliance, created on 1 July from the union of the Spectrum Management Agency and Austel). Some sectors have had to be specifically targeted, like scientific medical instruments and the IT sector, particularly assemblers. He said the backyard operators were the hardest to reach.

It has been decided by the ACA that there is no justification for an across-the-board generic immunity standard as it is in companies' own interest to ensure their products are immune. However it is looking at mandatory requirements for specific product areas where lives are at stake, eg, medical equipment. It is also working closely with New Zealand, and it is expected that within a couple of years the EMC regulations for the two countries will be the same.

McAlister said the ACA has been very satisfied with compliance to date; of the 300 audits they have done, only 1-2% of these have required "strong arm tactics" to induce them to comply. So far no-one has been prosecuted for non-compliance. A couple of companies ("local distributors who were testing us") have been asked to withdraw product however. He says there have been good vibes from the industry about the effects of the framework generally, particularly with regard



*Chris Zombolas pushed EMC technologies.*

to the improved access to European markets.

A lot of companies have been using their compliant status as a marketing tool. The additional cost of compliance has been absorbed by the industry and there have been very few complaints. He said there have been good reactions to the "light touch" tactics of the ACA itself too, with its emphasis on self-regulation and self-declaration rather than an authoritarian, policing style.

Chris Zombolas of EMC Technologies is not so sure of the effectiveness of the ACA's light touch however. Zombolas has reported that since the introduction of the framework, business has been nowhere near what everyone anticipated. He says this is partly because the ACA is being very lenient at this point, and he feels that until they start to get hardline, there will not be a high level of compliance. Misunderstanding of the requirements is another reason, as many small players are claiming compliance on the basis of manufacturers' test results which are often highly flawed. He says there are also those not wanting to comply due to paper thin margins, such as PC assemblers, and finally, offshore test houses are increasingly being used by local companies.

However he feels that as time goes on, compliance will increase significantly, especially when the ACA starts to get serious about prosecuting non-compliers, more like the European authorities. He feels this will have to happen in the next year.

## Deregulation of telecommunications — bingo! Prices drop

The deregulation of the telecommunications sector occurred on 1 July this year,

enabling new players to enter the market without impediment, imposing no limits on the number of carriers and no artificial market boundaries or restrictions. The aim of the exercise was to cause the market to provide a broader range of services and applications, better quality of service and lower prices, thereby increasing its international competitiveness.

Rob Irwin, in AEE's April editorial said, "Depending on who you listen to, deregulation will either drive the electronics industry through the roof or drive it into the ground. I think the reality will be that deregulation will present a wealth of opportunities for enterprising electronics companies who can find the right niches, but there will be traps for players who don't get up to speed quickly on the new rules or who can't adapt quickly enough to the changing market. It will be survival of the fittest."

While it is early days yet, Telstra is optimistic that the changes, though inevitably causing the company to lose market share, will provide sufficient opportunities for new business development and growth, as the emerging full competition is expected to be fierce. Certainly the equipment supply industry will be cashing in from the influx of new style international carriers.

Grant Simons, executive manager Telecommunications Standards with the Australian Communications Authority, said the regulation of the new playing field was shaping up well. "Since entering the final phase of self-regulation on 1 July 1997, the industry has risen to the occasion and in four months made astonishing progress. The Australian Communications Industry Forum in particular is now running at almost full speed in developing standards and codes, and is quickly coming to grips with the management of upstream contributions into international and regional forums."

Peter Gilmartin, executive manager of consumer affairs with the ACA, said there are now 12 carriers registered with them, though these are not all fielding calls - those who own or operate infrastructure are also carriers. Since deregulation there has been fairly aggressive marketing in long distance calls, to obtain, retain or increase market share. ACIF has been instrumental in creating customer service guarantee standards.

## The distributor and the Internet — symbiosis or struggle?

This year has seen distributors feel the long hand of the Internet tapping them on the back, with increasing numbers of purchasers buying straight from overseas sites. A 40% reduction in the local





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- ◆ **MP** range are suitable for medium discharge periods between 30 minutes and 5 hours. Typical applications include Offshore and marine power, lighting and turbine controls.
- ◆ **HP** range are suitable for high discharge rates of 1 second to 60 minutes. Typical applications include Switch tripping and closing, UPS and engine start.
- ◆ **UHP** range is also designed for very high discharge rates of 1 second to 60 minutes but will offer a higher performance than the HP range and is suitable for similar applications.

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# TECHNICAL FUNDAMENTALS

OPERATING VOLTAGES		GENERAL SELECTION GUIDE							
CELL VOLTAGES	DESCRIPTION	1.16	HP	HP	MP	MP	MP	MP	LP
1.80 TO 1.60	BOOST VOLTAGE	1.14	HP	HP	MP	MP	MP	MP	LP
1.60 TO 1.50	AUTO BOOST	1.12	HP	HP	MP	MP	MP	MP	LP
1.50 TO 1.40	FLOAT VOLTAGE	1.10	HP	MP	MP	MP	MP	MP	LP
1.28	OPEN CIRCUIT	1.08	HP	MP	MP	MP	MP	MP	LP
1.20	NOMINAL VOLTAGE	1.06	HP	MP	MP	MP	MP	MP	LP
0.85	CRANKING VOLTAGE	1.04	HP	MP	MP	MP	MP	MP	LP
0.65	BREAKAWAY VOLTAGE	1.02	HP	MP	MP	MP	MP	MP	LP
		1.00	HP	MP	MP	MP	MP	MP	LP
			5M	15M	30M	1H	1.5H	2H	3H
									5H+

CONSTANT CURRENT CHARGING			
CELL RANGES	FULL CHARGE	EFFICIENT CHARGE	FAST CHARGE
LP MP UHP	C/5 FOR 10 HRS	C/5 FOR 7 HRS	C/3 FOR 2 <sup>1/2</sup> HRS - C/5 FOR 2 <sup>1/2</sup> HRS
HP	C/10 FOR 16 HRS	C/4 FOR 6 HRS	C/3 FOR 4 1/2 HRS

CONSTANT VOLTAGE CHARGING		
CELL RANGE	MINIMUM FLOAT	AUTOMATIC FLOAT
LP - MP	1.41 V/CELL	1.47 V/CELL
HP - UHP	1.40 V/CELL	1.45 V/CELL

Part Number	Capacity C5	Dimensions (mm)			Weight (Kg)
		L	W	H	
LP11	11	41	115	180	1
LP17	17	55	115	232	1.5
LP28	28	55	115	232	1.9
LP37	37	64	115	232	2.4
LP46	46	75	115	232	2.8
LP56	56	75	115	232	2.85
LP65	65	75	115	232	2.9
LP80	80	58	139	401	5.2
LP95	95	58	139	401	5.4
LP105	105	58	139	401	5.5
LP135	135	75	139	401	7.1
LP165	165	103	165	401	10.1
LP200	200	103	165	401	10.7
LP230	230	103	165	401	11.2
LP265	265	103	165	401	11.7
LP300	300	128	165	401	12.6
LP330	330	128	165	401	13.1
LP365	365	156	165	401	13.7
LP400	400	156	165	401	14.2
LP430	430	156	165	401	14.8

MP12	11	46	87	271	1.15
MP18	18	46	87	271	1.33
MP25	25	46	87	271	1.58
MP30	31	86	87	271	3.34
MP37	37	86	87	271	3.44
MP50	49	86	87	271	4.02
MP55	56	86	87	271	4.22
MP64	64	58	139	401	6.25
MP80	80	58	139	401	6.39
MP95	96	75	139	401	7.45
MP115	112	75	139	401	7.93
MP140	138	103	165	401	10.83
MP160	158	103	165	401	11.38
MP180	178	103	165	401	12.2
MP200	198	103	165	401	12.37
MP220	217	128	165	401	15.61
MP240	237	128	165	401	15.84
MP260	256	128	165	401	16.32
MP280	277	156	165	401	18.86
MP300	296	156	165	401	19.21
MP320	316	156	165	401	19.58

HP/UHP10	10	46	87	241	1.4
HP/UHP14	14	46	87	271	1.6
HP/UHP20	20	46	87	271	2.1
HP/UHP30	30	86	87	271	3.1
HP/UHP40	40	86	87	271	3.7
HP/UHP50	45	86	87	271	3.85
HP/UHP65	62	58	139	361	5.65
HP/UHP80	85	75	139	361	7.35
HP/UHP100	100	105	139	361	8.85
HP/UHP125	122	105	139	361	10.4
HP/UHP150	150	128	165	361	12.95
HP/UHP185	190	128	165	361	15.15
HP/UHP215	220	156	165	361	17.6
HP/UHP235	240	156	165	361	18.75

## BASIC DATA REQUIRED FOR A PRECISE BATTERY SIZING CALCULATION

- ◆ Maximum Voltage (for charging)
- ◆ Minimum Voltage
- ◆ Load Current (Amps)
- ◆ Standby Period
- ◆ Method Of Charging
- ◆ Nominal Voltage Of The System
- ◆ Temperature Range
- ◆ Space Requirements
- ◆ Installation Conditions

## DETERMINING THE NUMBER OF CELLS THAT YOU WILL NEED

The number of cells in a battery may be determined by simply dividing the nominal voltage of the system by the nominal voltage of a cell (1.2V).

System Voltage	Number of Cells	Typical Spread
24	20	18 - 21
30	25	23 - 25
48	40	32 - 42
110	92	84 - 93
220	184	180 - 186

In practice, the number of cells must be selected to suit the voltage limits of the system while meeting two conditions.

- 1 The float voltage must be adequate to charge the battery.
- 2 The battery must be capable of supplying the load for the required standby time and not fall lower than the minimum voltage.

Therefore the most accurate way is  $\frac{\text{System Float Voltage}}{\text{Cell Float Voltage}}$

**If in doubt please contact your nearest M+H office.**

**M+H Power Systems Pty. Ltd.**

A.C.N. 051 792 833

Head Office: 52 Glenvale Crescent, Mulgrave VIC 3170 Tel:(613) 9574 8611; Fax: (613) 9574 8655

New South Wales: Suite 5, 1st Fl., Unit 3, 35 Doody Street, Alexandria, NSW 2015 Tel: (612) 9667 1600; Fax: (612) 9667 1221

South Australia: PO Box 477 Welland, SA 5007 Tel: (618) 8340 2664; Fax: (618) 8340 1484

Queensland: PO Box 137, Archerfield, QLD 4108 Tel: (617) 3344 4300; Fax: (617) 3344 4577

Western Australia: PO Box 837, Scarborough, WA 6019 Tel: (618) 9245 1121; Fax: (618) 9245 1510



# Australian Electronics ENGINEERING

## 1997/98 Yearbook update

Due to technical problems, a number of companies were left out of the **Test & Measurement Equipment** brand listing on pages 68 and 69 of the November issue of *AEE*. This leaflet should be placed between those pages of the magazine and consulted instead of the printed list. Our apologies to all companies left out of the original listing.

The list is designed to help you find the distributor of a particular brand. Brands are listed alphabetically in bold type with the distributor(s) underneath.

### Test and Measurement Equipment

**ADVANTEST**  
Rohde & Schwarz (Australia)  
**AEC**  
Priority Electronics  
**A.E.G.**  
Master Instruments  
**AEGIS**  
Aegis  
**AEMC**  
Cliff Electronics (Aust) Pty Ltd  
Obiat Pty Ltd  
Transcat  
**ALCATEL-STR**  
Wandel & Goltermann  
**ALGODUE ELETTRONICA SRL**  
Emona Instruments  
**AMAGRUSS**  
Amalgamated Instrument Co  
**AMERICAN RELIANCE**  
Computronics Corporation Ltd  
**AMERITEC**  
Vicom Australia  
**AMETEK**  
Umcos Trading  
**AMP**  
Australian AMP  
**AMPHENOL**  
Amphenol  
**AMPLIFIER RESEARCH**  
RFI Industries Pty Ltd  
**AMPROBE**  
Power & Interference Consultants  
Transcat  
**ANALOG DEALERS INC**  
W&B Instruments Pty Ltd  
**ANALOGIC**  
Kenelec Pty Ltd  
Obiat Pty Ltd  
Transcat  
**ANRITSU**  
Anritsu Wiltron P/L  
**APPA**  
Nielsen Technologies  
**APPLIED**  
Scientific Devices Australia  
**ARBITER**  
Nielsen Technologies  
**ARLUNYA**  
Dindima Group  
**ASAHI KEIKI CO LTD**  
Emona Instruments  
**ASTRO-MED INC**  
Metromatics  
**AUDIO PRECISION**  
Vicom Australia  
**AVO**  
Foster Test Equipment  
**AVPOWER UK**  
Obiat Pty Ltd  
**AZURE TECHNOLOGIES**  
G N Nettest Pty Ltd  
**BALLANTINE**  
Dindima Group

Scientific Devices Australia  
**BEHA**  
Nielsen Technologies  
Transcat  
**BEHLMAN**  
Nielsen Technologies  
**BESTA**  
Honeywell  
**BIDDLE**  
Foster Test Equipment  
Rapid-Tech  
**BIRD ELECTRONICS CORPORATION**  
Vicom Australia  
**BLACKSTAR**  
Cliff Electronics  
Obiat Pty Ltd  
**BOONTON**  
Scientific Devices Australia  
**BOULDER CREEK**  
Alfa-Tek Australia  
**BROWNELL**  
Nalmos Components  
**BURSTER**  
ACM Laboratory  
**BWD**  
McVan Instruments  
**C&C INSTRUMENTS**  
Macservice Pty Ltd  
**CAB**  
Baack & Co Hamburg  
**CALIFORNIA INSTRUMENTS USA**  
Obiat Pty Ltd  
**CAMILLE BAUER**  
Master Instruments  
**CARLO-GAVAZZI ITALY**  
Obiat Pty Ltd  
**CARNEL LABS**  
RFI Industries Pty Ltd  
**CESVA**  
Emona Instruments  
**CEWE INSTRUMENT**  
TMS Australasia Pty Ltd  
**CHAUVIN ARNOUX USA**  
Obiat Pty Ltd  
**CHROMA AND SUNSHINE ELECTRONICS**  
Nucleus Computer Services  
**CIE TAIWAN**  
Obiat Pty Ltd  
**CIRRIS**  
Fabrication Australia Holdings  
**CLOCK**  
Boston Technology  
**COLINE**  
Nielsen Technologies  
**COMPLIANCE DESIGN INC**  
RFI Industries Pty Ltd  
**COMPOWER**  
Austest Laboratories  
**CREDENCE TECHNOLOGIES INC**  
Clarke & Severn

**CUMING CORP**  
Advanced Systems  
**CYBER**  
Boston Technology  
**DANBRIDGE**  
Bell-Mem/Warburton Franki  
**DATAKOM**  
Nielsen Technologies  
**DATACOMM**  
AC&E  
**DATATAKER**  
Data Electronics (Aust) Pty Ltd  
**DATRON**  
Scientific Devices Australia  
**DATUM**  
Scientific Devices Australia

**DATUM EFRATOM**  
Dindima Group  
**DELTA OHM ITALY**  
Obiat Pty Ltd  
**DIAGNOSYS**  
Fabrication Australia Holdings  
**DIGITECH INDUSTRIES**  
Marconi Instruments  
**DOPPLER SYSTEMS**  
T&M Instruments Pty Ltd  
**EDP LABORATORIES**  
Master Instruments  
**EIP MICROWAVE**  
Marconi Instruments  
**EL**  
Axion Australasia  
**ELAN**  
Alfa-Tek Australia  
**ELCONTROL**  
Nielsen Technologies  
**ELECTROMETRICS**  
Rojone Pty Ltd  
**ELDITEST ELECTRONIC GMBH**  
Emona Instruments  
**ELECTRONIC DEVELOPMENT CORPORATION USA**  
Applied Measurement Australia  
**ELEKTRONIKA**  
Wandel & Goltermann  
**ELGAR**  
Scientific Devices Australia  
**EMC SYSTEMS**  
EMC Technologies  
**EMC-PARTNER**  
RFI Industries Pty Ltd  
**EMCO DIV**  
RFI Industries Pty Ltd  
**EMF-EMI CONTROL**  
RFI Industries Pty Ltd  
**EMI**  
Nielsen Technologies  
**EMTEK**  
Wavecom Instruments  
**ENI**  
Scientific Devices Australia

**ENTRAN**  
Scientific Devices Australia  
**EPL LIMITED**  
Dewar Electronics  
**ESCORT**  
Emona Instruments  
Wavecom Instruments  
**ESP**  
Wandel & Goltermann  
**ETITEMP**  
Umcos Trading  
**EUROSMC**  
Nielsen Technologies  
**EVERETT CHARLES TECHNOLOGIES**  
Fabrication Australia Holdings  
**EXFO ELECTRICAL-OPTICAL**  
Vicom Australia  
**FIBERNET**  
Australian AMP Pty Limited  
**FINEST INSTRUMENTS CORP**  
Emona Instruments  
**FLANN MICROWAVE**  
Independent Distribution Network  
**FLUKE**  
AFC Group Pty Ltd  
Cliff Electronics  
Colourview Electronics  
GEC Electronics  
KC Electronics  
Obiat Pty Ltd  
Philips Test & Measurement  
Rapid-Tech  
Transcat  
**FOSTER**  
Foster Test Equipment  
**FRITZ-KUBLER**  
Nalmos Components  
**FUNCTIONAL TESTING**  
Derian  
**FURUKAWA ELECTRIC**  
Vicom Australia  
**FW BELL**  
Independent Distribution Network  
Transcat  
**GAGE APPLIED**  
Scitech Pty Ltd  
**GAMMA SCIENTIFIC**  
Laser Electronics (Operations)  
**GAMRY INSTRUMENTS**  
Westinghouse Industrial Products  
**GEMS**  
Honeywell  
**GENERAL RESISTANCE**  
Transcat  
**GENTEC**  
Laser Electronics (Operations)  
**GIGATRONICS**  
Scientific Devices Australia  
**GLOBAL**  
Transcat  
**GN ELMI**  
G N Nettest Pty Ltd

**GN LASER PRECISION**  
G N Nettest Pty Ltd  
**GN NAVTEL**  
G N Nettest Pty Ltd  
**GOLDSTAR**  
Nielsen Technologies  
Obiat  
Transcat  
**GOOD WILL**  
Emona Instruments  
Wavecom Instruments  
**GOULD INSTRUMENT SYSTEMS**  
Scientific Devices Australia  
**GRAHNERT PRACITRONICS**  
Wandel & Goltermann  
**GRUNDIG**  
Rohde & Schwarz (Australia)  
**HAEEFLY**  
TMS Australasia Pty Ltd  
**HAMEG INSTRUMENTS**  
Kenelec Pty Ltd  
**HART SCIENTIFIC**  
Amalgamated Instrument Co  
**HC POWER**  
Dewar Electronics  
**HCK**  
Colourview Electronics  
**HEME**  
Electronic Assembly Queensland  
**HEWLETT PACKARD**  
Hewlett Packard  
**HILO**  
Alfa-Tek Australia  
  
**HIOKI**  
Nielsen Technologies  
**HIRSCHMANN**  
Mayer Krieg & Co  
**HITACHI**  
Bell-Mem/Warburton Franki  
**HOLADAY INDUSTRIES INC**  
RFI Industries Pty Ltd  
**HONEYWELL**  
Honeywell  
**HUNG CHUNG**  
Amalgamated Control Systems  
**HUNTRON**  
Metromatics  
Transcat  
**IDI**  
Machinery Forum (Vic)  
**IFI**  
EMC Technologies  
**IFR SYSTEMS**  
Vicom Australia  
**INGUN PRUFMITTEL GMBH**  
Ingun (Australia) Pty Ltd  
**INSTRUMENT SPECIAL TIES**  
RFI Industries Pty Ltd  
**INTERNATIONAL DATA SCIENCES**  
Dindima Group  
**IOTECH**  
Scientific Devices Australia



# Test and Measurement Equipment

## ISKRA

Wavecom Instruments

## ITT POMONA

KC Electronics

## JAUQUET

Amalgam Control Systems

## JOFFRA

Umcos Trading

## KALMUS

Scientific Devices Australia

## KEITHLEY INSTRUMENTS & RADIATION

Scientific Devices Australia

## KEITHLEY METRABYTE

Nilsen Technologies

Scientific Devices Australia

## KENWOOD

Nilsen Technologies

Transcat

## KEPCO (QLD ONLY)

Cliff Electronics

## KIKUSUI

Emona Instruments

Wavecom Instruments

## KINGFISHER INTERNATIONAL

Kingfisher International Pty Ltd

## KONIG

Skandia Electronics

## KYORITSU

Bell-Mem/Warburton Franki

## KYOWA

Nilsen Technologies

## LAB CORP VIBRATION

Measurement Technology

## LARSON-DAVIS

Vipac Engineers & Scientists

## LAYSON SINGLE PHASE

Layson Pty Limited

## LEADER

Stantron

## LECROY

Philips Test & Measurement

## LIBERTY INSTRUMENTS

ME Technologies

## LINDOS (ANALOG AUDIO)

Musiclub

## LINE SEIKI

Nalmos Components

## LINEAR X

ME Technologies

## LOCKHEED MARTIN M/W - L3

## COMMUNICATIONS

Rojone Pty Ltd

## LODESTAR

Macservice Pty Ltd

## LOGICAL DEVICES INC

Emona Instruments

## LORAL MICROWAVE

Rojone Pty Ltd

## LUCIFER

Honeywell

## LUTRON

Master Instruments

## MANSFIELD AND GREEN

Umcos Trading

## MIA-COM

T&M Instruments Pty Ltd

## MODCAL

Umcos Trading

## MPM

Honeywell

## MAGNETIC SHIELD CORP

RFI Industries Pty Ltd

## MARCONI INSTRUMENTS

Marconi Instruments

## MARTEL

Transcat

## MATERIALS AND

## REFLECTOMETERS

Specialised Conductives

## MATHAWAY POWER

## INSTRUMENTATION

Tech-Fast T & M Pty Ltd

## MAURY

Scientific Devices Australia

## MAXITROL

Honeywell

## MCDONNELL & MILLER

Honeywell

## MEGGER

Foster Test Equipment

Rapid-Tech

## MELCHER

Scientific Devices Australia

## METER INTERNATIONAL

Computronics Corporation Ltd

## METRIX

Nilsen Technologies

## MICROSWITCH

Honeywell

## MICROTEST

AES Hartland Cables

Computer Systems Services

## MIDTRONICS

M&H Power Systems

## MILLER FLUID POWER

Honeywell

## MILLIMETRE WAVE

Specialised Conductives

## MOD-TAP

Mod-Tap (Australia)

## MODULAR ELECTRONIC

AME System

## MOLEX

Utilux Pty Limited

## MONITRAN

Vipac Engineers & Scientists

## MOTOROLA

Aegis

## MULTI-AMP

Foster Test Equipment

## MULTILIN

Control Logic QLD

## NARDA

Nilsen Pty Ltd

## NATIONAL

Scientific Devices Australia

## NATIONAL INSTRUMENTS

National Instruments

## NEC-SAHEI

Bell-Mem/Warburton Franki

## NICOLET

Emona Instruments

Wavecom Instruments

## NILSEN

Nilsen Technologies

## NOISE/COM

Electronic Development Sales

## NOYES

Anderson Corporation Pty Ltd

## OBJECT SYSTEMS INTEGRATORS

Wandel & Goltermann

## ODETICS TELECOM

Marconi Instruments

## OEI

Wavecom Instruments

## OMICRON

Nilsen Technologies

## ONO SOKKI

Vipac Engineers & Scientists

## OPALPORT

M&H Power Systems

## OVERLAND DATA

Nilsen Technologies

## PACIFIC SCIENTIFIC

Honeywell

## PANTEC

Cliff Electronics (Aust) Pty Ltd

Oblat Pty Ltd

## PARALLAX

Alfa-Tek Australia

## PENTEK

Scientific Devices Australia

## PHILIPS

Oblat

Philips Test & Measurement

## PHIPPS & BIRD

Transcat

## PHOTODYNE

AFC Group Pty Ltd

## PHOTON KINETICS

Nilsen Technologies

## PICO TECHNOLOGY

Emona Instruments

## POLAR

Wavecom Instruments

## POWER TEST

Dewar Electronics

## POWERSENSE TECHNOLOGY

Westinghouse Industrial Products

## PRAGMATIC INSTRUMENTS

Marconi Instruments

## PRELCO

Dindima Group

## PREMA

Emona Instruments

Wavecom Instruments

## PRIORITY ELECTRONICS

Priority Electronics

## PRISM (DIGITAL AUDIO)

Musiclub

## PROCHIPS

Alfa-Tek Australia

## PRODUCTION TESTING

Derian

## PROGRAMMA

TMS Australasia Pty Ltd

## PROMAX

Emona Instruments

Wavecom Instruments

## PROTEK

Aztronics

## PROTEQ TECHNOLOGIES

Metromatics

## PTS

Scientific Devices Australia

## QMAX

Wavecom Instruments

## QUADTECH

Nilsen Technologies

Transcat

## RACAL INSTRUMENTS

Racal Australia

## RADAR ABSORPTION

Specialised Conductives

## RADCOM

Nilsen Technologies

Vicom Australia

## RADIOMETER ANALYTICA

Radiometer Pacific

## RANATEC

Step Electronics

## RANTEC DIV

RFI Industries Pty Ltd

## RFI CORPORATION

RFI Industries Pty Ltd

## RION

Bell-Mem

Wavecom Instruments

## ROCKLAND

Scientific Devices Australia

## ROHDE & SCHWARZ

Rohde & Schwarz (Australia)

## ROTEK INSTRUMENT CORP.

Dindima Group

## SAAB

Honeywell

## SADELTA

Emona Instruments

## SAMPO

Macservice Pty Ltd

## SCAN 3000

Honeywell

## SCHAFFNER

Colourview Electronics

Westinghouse Industrial Products

## SCIENTIFIC EQPT

## MANUFACTURERS

Coltronics Systems Pty Ltd

## SEAWARD

Emona Instruments

Wavecom Instruments

## SEBA

Aegis

## SEMPRESS

Honeywell

## SENSIT (UK)

Amalgamated Instrument Co

## SENSITECH INC

Independent Distribution Network

## SENTEK

Amalgamated Instrument Co

## SEW

Emona Instruments

Wavecom Instruments

## SILVERTRONIC UK

Oblat Pty Ltd

## SIMCL

Fabrication Australia Holdings

## SIMCO

I.T.W. Finishing Systems P/L

Simco

## SIMPSON

Independent Distribution Network

Transcat

## SISTEM PNEUMATICA

Honeywell

## SKINNER VALVE

Honeywell

## SMARTLINE

Honeywell

## SMITH DESIGN

Emona Instruments

## SOLAR ELECTRONICS CO

RFI Industries Pty Ltd

## SORENSEN

Scientific Devices Australia

## SOUND TECHNOLOGY

Dindima Group

ME Technologies

## SPIRICON

Laser Electronics (Operations)

## STANORD RESEARCH SYSTEMS

Scientific Devices Australia

</



# What makes new Mathcad 7 the world's most innovative calculation software? Let's talk addition.



**MORE POWER**



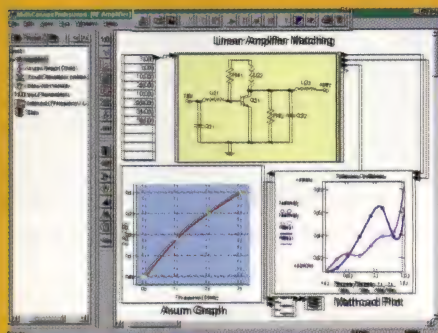
**EASIER TO USE**



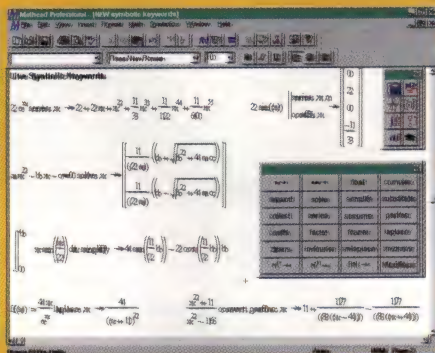
**TOTALLY WIRED**

How did simple addition make Mathcad 7 exponentially better? Consider what was added. Like increased power. A more refined interface. Easier equation editing. A richer programming environment. Greater access to deep technical content. And full Web integration — with

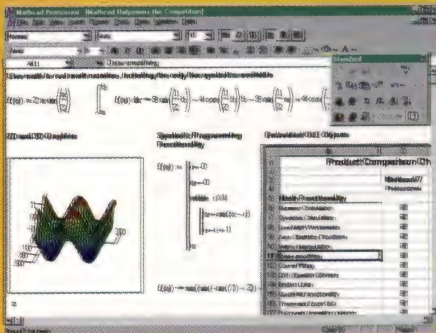
Microsoft® Internet Explorer built right in. All these additions let corporate workgroups increase productivity — so it's no wonder Mathcad continues to be the world's best-selling calculation software for technical professionals. Looks like the best just got better.



New MathConnex™ gives you the flexibility to combine components from several applications, such as Excel or MATLAB™, in a fully functional system. Feed the frequency output to a Mathcad plot or the gain curve to Axum®. Wire them together and show your entire model working in one window.



New symbolic keywords allow you to descriptively show the operations you perform. Convert an expression to a partial fraction and Mathcad's self-documenting nature explains what you're doing. As always, Mathcad's calculations are live: make a change and your answers are recalculated instantly.



Full support for OLE 2 including automation allows you to drag-and-drop Excel objects into Mathcad and make them functional components, or embed Mathcad objects in your spreadsheet.

To upgrade call **1-800-35-MATH**. To order Mathcad 7, visit us at **www.hearne.com.au**. For corporate licensing, call **1-800-35-MATH**.



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Scientific Software

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Phone: 03-9602-5088 Fax: 03-9602-5050  
Email: info@hearne.com.au WWW: www.hearne.com.au





market for components is one figure being bandied about, however AEE was unable to confirm this figure. If it is true and the trend continues, it could spell big trouble for some companies.

Avnet Pacific and Memec both claim not to have felt any impact from this phenomenon as they both offer value-added services and feel this is protecting them. Greg Howard, NSW sales manager with Avnet Pacific, said, "There are no return rights when you buy off an Internet wheel-dealer, and there is no product support." A lot of people are using the Internet to get a sort of "benchmark price" and then using that to lever a deal with local distributors.

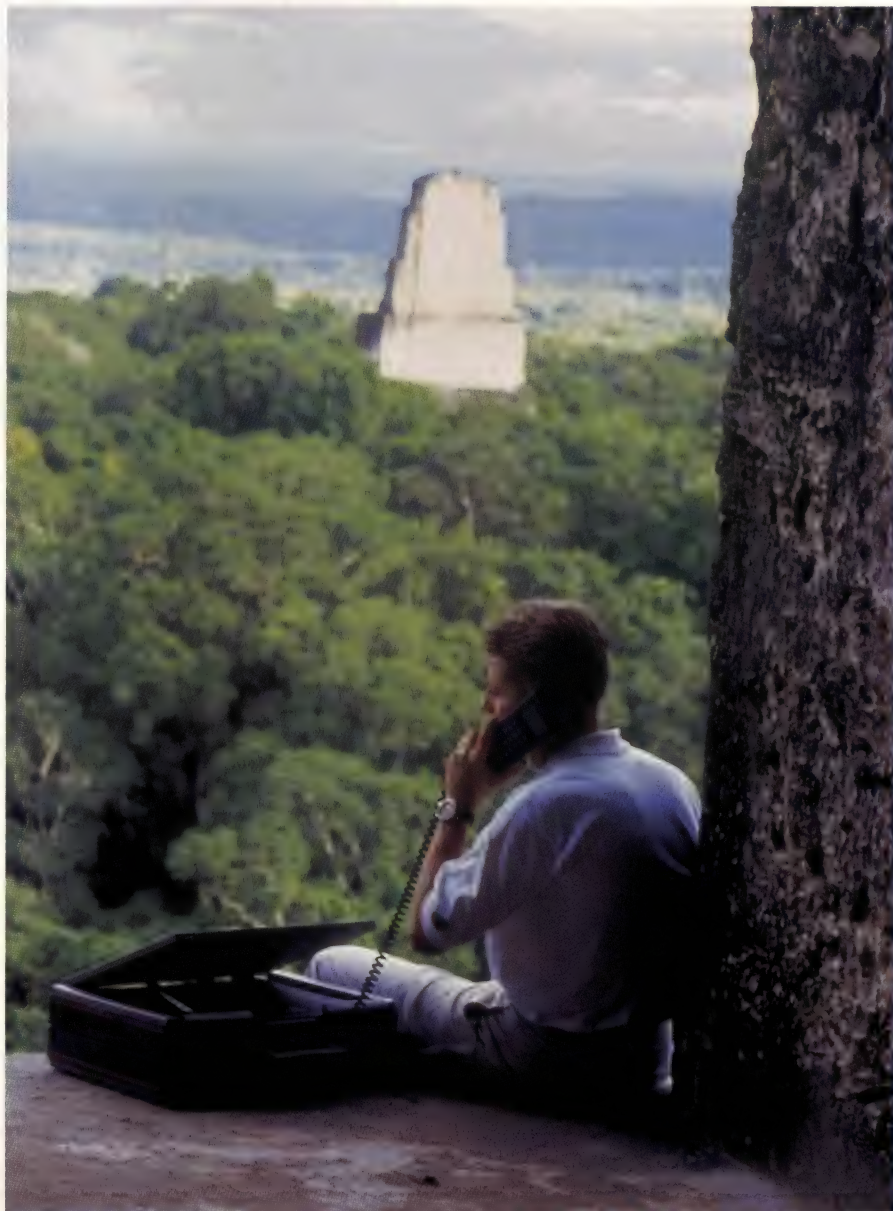
Howard has found the Internet far more of a boon than a business-burglar. Avnet has a comprehensive home page with the companies its represents hyper-linked to it, and it uses the net as a resource provider for customers, as well as a marketing tool. He estimates that so far they have picked up between a half and one million dollars worth of new business directly from email enquiries. He commented: "Our market share has increased nine months in a row, so we certainly aren't feeling any loss."

Some distributors commented that if you don't offer value-added services and face-to-face local support, you might experience a loss of business to cheaper online companies. RS Components said they haven't felt a loss as they are operating in a specialist market. Low price has never been one of their features — their niche was a massive inventory always in stock.

## Asian currency crisis - buckle your seat belts

A large (smoke obscured!) question mark is hanging over many SE Asian contracts following the recent collapse of local currencies. If the currencies stay low, companies operating in the region may not be able to afford contracts already signed in US dollars. Australian companies are waiting with bated breath to see if their contracts will be honoured (see "Asian slide hits home" p.6)

It also means that a lot of offshore companies are not currently capable of supplying at the moment. HarTec says it has received quite a lot of extra business of late from large overseas companies no



*New communications services were on offer during the year. Whether they will be good for the industry is a moot point.*

longer able to get their product from Asia.

The *Australian Financial Review* reported on 10 November that "while the largest share of Australia's exports may now go to Asia, according to Mr Downer, only about 10% of Australia's exports are sold to the four nations at the centre of the financial market storm — Malaysia, Thailand, the Philippines and Indonesia. But the chances of containing the crisis to those four countries appear to be growing more doubtful by the day, with markets in Japan and Korea facing increasing pressure."

Downer's downplaying of the situation seems dubious, as AEEMA reports that the "vast majority" of Australian companies export to emerging markets such as Indonesia, China, the Philippines, Malaysia and Vietnam. We will have to wait until the new year to see the full extent of the damage to

Australian businesses.

## 1997 — movin' on up, movin' on out

While no-one is saying we don't need to become internationally competitive, it cannot be said that globalisation is a good thing for this country. In fact there is a lot of evidence to the contrary. AEE's October editorial highlighted how it has been "an unmitigated disaster" for Australian manufacturing, resulting in fewer jobs, more imports and an industry a lot smaller than it could be. However the same forces represent a potential goldmine for other parts of the electronics industry. What is certain is that a shake-down is occurring and business boundaries are being redefined. 1997 might be remembered as a watershed year between the old ways and the new. □

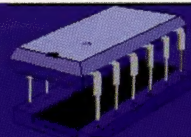
**T&M Macservice Pty Ltd**  
**Price is Right!**  
 (03) 9562 9500 **1800 680 680**



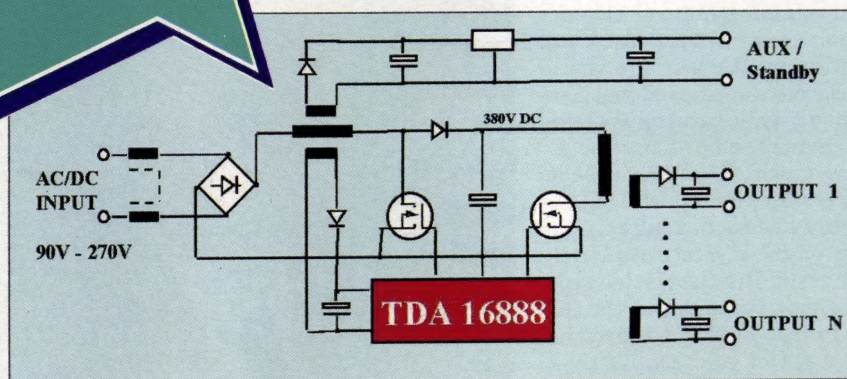
# SIEMENS

## Benefits by innovation

### Power Combi TDA 16888



**PFC-IC  
+  
PWM-IC**



The Power Combi IC TDA 16888 is designed for new generations of Switch Mode Power Supplies (SMPS). This 20-pin device meets all requirements of systems like desktop PCs, monitors, colour TVs or industrial electronics. In applications which have to comply to global requirements for Power Factor Control, TDA16888 offers a cost effective system solution.

#### Features and Benefits

- Controlled start-up current from 50  $\mu$ A only.
- Wide input voltage range (90V-270V).
- Wide load variation possible - from nominal down to zero Watts.
- Controls different SMPS topologies (Feedforward, Flyback..etc.)
- Controls auxillary power supply for standby operation.
- Standby operation with very low power consumption possible.
- Fixed frequency (adjustable) operation.
- Externally synchronized operation possible.
- Preconverter (PFC) and PWM are internally synchronized.

- Leading edge **Preconverter (PFC)** and trailing edge **PWM** with 50% duty cycle.
- Able to control MOSFETs and/or IGBTs.
- Overvoltage protection of Preconverter (PFC) + 10% of nominal Bus voltage.
- Overvoltage protection of PWM + 20% of nominal Bus voltage.
- Due to improved current loop control mode, less EMI.
- Driver stage with reduced EMI and saturation protection.
- Designed according to Failure Mode Effect Analysis (FMEA) rules.

#### For more information, contact:

**Siemens Ltd  
Semiconductor Sales**  
544 Church Street  
Richmond - Victoria 3121  
Telephone : (61) 03-9420 7111  
Facsimile : (61) 03-9420 7275

#### SALES OFFICES

**AUSTRALIA**  
**Siemens Ltd**  
**Sydney**

Tel : (61) 02-9950 8711  
Fax : (61) 02-9950 8644

**NEW ZEALAND**  
**Siemens Ltd**  
**Auckland**

Tel : (64) 09-520 3033  
Fax : (64) 09-520 1556

**NEW ZEALAND**  
**Siemens Ltd**  
**Christchurch**

Tel : (64) 03-365 8411  
Fax : (64) 03-365 8413

#### DISTRIBUTORS

**AUSTRALIA**  
**Advanced Components**  
**Distributors Pty Ltd**

Tel : (61) 03-9762 7644  
Fax : (61) 03-9762 5446

**AUSTRALIA**  
**Ramelec (VIC.) Pty Ltd**

Tel : (61) 03-9556 5803  
Fax : (61) 03-9532 3866



# Denis Garner

## *Rescued at the Last Second*

**H**artec is one of a rare breed. It is one of the few Australian companies that still makes a major commitment to electronics manufacturing in Australia. Until recently, most observers would publicly have applauded that commitment, while privately putting their money somewhere else.

For much of the last decade, as electronics manufacturing has steadily declined, that attitude was a sensible response to a shrinking market. But the Hartec experience shows that it is not the only one. In fact, evidence is growing that a pot of gold awaits those who are prepared to indulge in electronics manufacturing. There is a caveat, of course. You need to be very, very good to succeed, and the margin for error is very, very, small.

Last year, Hartec underwent a major restructure to rebuild itself, and to recover from years of poor management focus and operational inefficiencies. It is now divided into two strategic business units: distribution and manufacturing services.

In terms of performance, the most spectacular gains have been from the manufacturing sector. Inventory handling has been improved, the direct costs of labour and factory overheads are being cut and plant efficiency is being improved.

Most importantly, new arrangements with customers are being put in place. Hartec recently signed a three-year contract with Sydney-based modem-builder Netcomm to undertake all its manufacturing. The man in the hot seat is the manufacturing general manager, Mr Denis Garner. He started his career with BT-the British telco - and worked in many operational areas of BT's management.

After leaving BT, he quickly climbed the management ladder with the communication giant CASE eventually relocating to New Zealand where he spent three years, before moving to Sydney to



work for communications equipment distributor Anixter.

In 1997 he was offered a job as the general manager of Hartec's manufacturing division, specifically to refocus and increase the size of the business unit.

Garner readily concedes that the division had serious problems when he took over. In fact, without intervention, it would have bled the organisation dry. But now he says there is every reason to be optimistic about its future.

In many respects, the \$20 million deal with Netcomm was the icing on top of the cake for the division. Buoyed up by this success, he is on track, he says, for \$45 million worth of orders by the end of the financial year. Most of the new business is being written with telecommunications companies. Medical imaging and miscellaneous contracts make up about 40 per cent.

He says about 60 per cent of the business is export, and is quite sanguine about the effect of imports on the industry. "We can definitely manufacture at

lower costs than in the US or UK, and I believe we can rival or beat the Asian houses, especially if one compares similar quality products". This belief will underpin a major sales drive into North America this year.

In fact, Garner is enthusiastic about the effect of globalisation on the industry as a whole. "It is true that lower tariffs have taken their toll of the industry, but I believe we are now in a position where we can take advantage of the situation. The world-wide growth in demand for electronic products will more than compensate us for the loss of business in the Australian marketplace that we will experience through lowering tariffs further.

"Australian industry is now competitive across the board on an international basis. We are finding, for instance, that more local companies than ever are coming

through the door with prototypes that will depend for their success on the international marketplace. "In particular, I think our section of it — contract manufacturing — is set to boom. Manufacturing is a difficult business, and should be left to experts. That means we have to develop a model of doing business in which other companies feel comfortable with allowing us to undertake a core part of their business. It's a big ask, but it can be done. The key is open, honest and prudent business dealings. "I would say that, to date, the best example of that has been the deal with Netcomm. So far, things are working better than we ever imagined. Demand is considerably higher than we anticipated, mainly because no-one seems able to appreciate how fast the Internet is going to grow.

"Am I an optimist? Sure. But I am also a realist. We can make manufacturing work in Australia. We will have to pay attention to quality and technical issues, but we can do it." □

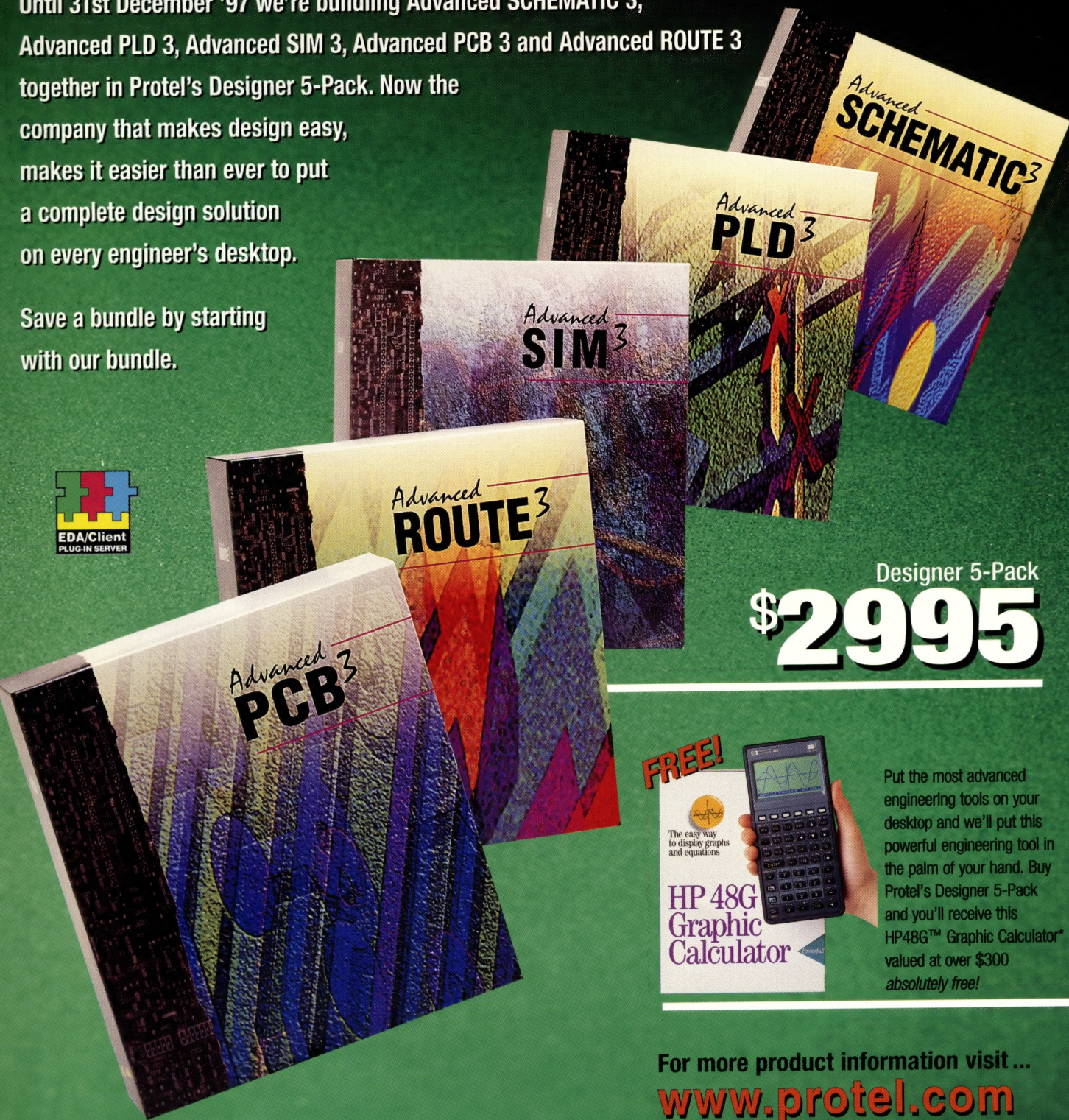


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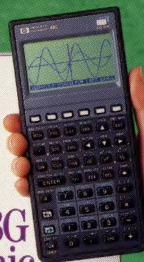
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